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SUMMARY OF RECENT ABSTRACTS*

I. CHOLERA

Epidemiology

SHOUSHA (p. 462) has published an account of the Egyptian cholera epidemic of September–November 1947. He shows that there were 20,804 cases, with a case-mortality rate of about 50 per cent. Preventive measures included protection of water supplies and food, isolation of cases and contacts, inoculation, and a campaign against flies. The vibrio was isolated from 2·1 per cent. of contacts examined, but only 0·6 per cent. of the total contacts became ill; vibrios were not isolated more than 19 days later in any contact. The "carrier" state persisted up to 42 days from the onset of illness in cases of cholera. The vibrio remained viable up to the third day on artificially contaminated foodstuffs; in acid fruits it died in a few hours. The author discusses the quarantine rules adopted by various neighbouring countries, some of which were unnecessarily severe.

DE MOOR (p. 738) discusses the outbreaks of cholera-like disease which occurred in Celebes on several occasions. The vibrio associated with the disease could be differentiated from *V. cholerae* but not from the El Tor vibrio, and it was found in cases and contacts, and in water; it has also been found in healthy persons and water in places where there has been no outbreak. It is derived from human sources and does not thrive in water; it remains long in a district because human beings become healthy carriers, though not for long. The El Tor vibrio is occasionally pathogenic, but usually causes disease of relatively low mortality. The author suggests that the disease should be known as paracholera El Tor, and that it does not call for the strict quarantine, isolation and mass immunization practised in outbreaks of true cholera.

Aetiology: Vaccination

VEERARAGHAVAN (p. 740) has devised a simple medium for the cultivation of *V. cholerae*.

GOHAR and MAKKAWI (p. 36) experienced difficulty in infecting cats with *V. cholerae* by mouth, though suckling kittens could be fatally infected. Frogs were susceptible to intramuscular injection of the organisms.

FELSENFELD (p. 359) has found that three Inaba strains isolated in Egypt harboured fractions of *Salmonella* I, XII and g antigens.

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1949, v. 46. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

A factor in filtrates of *V. cholerae* has a specific effect on the epithelium of guineapig ileum, and is a mucin-splitting enzyme. SINGER *et al.* (p. 37) show that this factor is heat-labile, easily destroyed by acid, by ageing and by 0·3 per cent. formaldehyde. It can be neutralized by antibacterial sera, but only if they contain O antibodies; there is reason to believe, however, that there is some essential difference between the factor and the somatic antigen of the vibrio. The authors think that the production of this factor may be connected with the virulence of strains; its action could explain most of the symptoms of cholera. The same authors (p. 360) prepared cholera vaccine in several different ways (by heating, addition of formalin or alcohol) and tested the effect of these vaccines, given subcutaneously or intradermally, on the production of antibodies. There was little difference in the effects produced, but small abscesses occurred in a proportion of those given intradermal injections. The antibodies produced were identical by all methods, and they neutralized the property, possessed by filtrates of cholera cultures, of causing shedding of the epithelium of guineapig intestine.

It has already been shown that there is a group antigen common to the various strains of *V. cholerae* (known as antigen A) and that the Ogawa and Inaba strains contain, in addition to A, antigens B and C respectively. Other antigens (D to M) have also been detected in various strains. GALLUT (p. 631) has examined a large number of strains, and finds that antigen A is present in all agglutinable strains, and that its presence is enough to permit the diagnosis of *V. cholerae*. Most strains contain several of the other antigens, but B and C may also be present in inagglutinable vibrios, and are therefore valid in differentiation only if A is present; other antigens are of little importance except as indications of geographical distribution. For vaccines all antigens should be present.

BROUNST and MAROUN (p. 935) show that even after repeated doses of cholera vaccine the agglutinin response in man is poor, though better results are obtained if living *V. cholerae* are used, rather than formalin suspensions, in the agglutinin test. Similar conclusions are recorded by GALLUT and BROUNST (p. 935).

AHUJA and GURKIRPAL SINGH (p. 38) have tested the bactericidal titre of serum from persons inoculated with cholera vaccine. In all cases there was a rise in bactericidal titre after inoculation, and this was parallel to the passive protection conferred by the serum on guineapigs subsequently inoculated with virulent organisms in mucin. The agglutinin titre was not a good index of the bactericidal titre. After inoculation, immunity is considerable after the fifth day, but the response to re-inoculation 6 months later is poor. It seems that an Inaba vaccine affords as good protection against Ogawa infection as against Inaba, and *vice versa*.

SHRIVASTAVA *et al.* (p. 827) have immunized mice with polysaccharides extracted from *V. cholerae*, with results which compare favourably with those obtained with ordinary cholera vaccine.

Clinical findings: Treatment

GHANEM and MIKHAIL (p. 1030) discuss certain clinical and biochemical features of cholera as seen in Egypt in 1947. Water loss is more important than salt loss, and the authors recommend treatment with isotonic saline, or Ringer solution, until urinary chlorides reach 5 gm. per litre. After that the solution may be made hypotonic. Sodium lactate may be used to correct acidosis. Sulphaguanidine is also useful because of its local action and because absorption is slight. Blood chloride levels are influenced by the extent of dehydration, as well as by salt loss, and the same is true of blood potassium, protein and nitrogen. These are discussed in relation to treatment.

Tao *et al.* (p. 359) show that uraemia was the most serious complication in a group of 687 cases of cholera in Shanghai. The mortality rate in the whole series (in which treatment with saline with or without sodium bicarbonate or glucose was the routine) was 6·2 per cent. ; the highest rate was in children under ten. The authors tried sulphadiazine, but although there appeared to be some benefit they do not think that chemotherapy is likely to be very successful. In a group of recovered patients none excreted vibrios beyond the eighth day.

Arterial and venous pressures are reduced in cholera, and Zaki and Ragab (p. 257) found that the degree of reduction (especially of venous pressure) was proportional to the severity of the disease.

Dawson and Blagg (p. 143) found evidence of an antibacterial agent active against *V. cholerae* in the saliva of normal healthy persons in Egypt, but in samples from cholera patients the saliva showed little or no activity.

Gauld *et al.* (p. 826) have found chloramphenicol (chloromycetin) useful in the treatment of cholera induced by parenteral injection in mice, but it must be given within a few hours of infection. In man it would also be necessary to give it (or any drug) early, and restoration of fluid would continue to be necessary. Vomiting might make it necessary to administer the drug by injection. Chloramphenicol may have a value for prophylaxis. This work was done in animals ; trials in man are indicated.

Little and Subbarow (p. 143) have tested a number of chemicals for their inhibitory effect on *V. cholerae*, by the mouse-protection test. The only chemicals showing activity were 2-sulphanilamidopyrimidine and some of its derivatives.

Control

Seal (p. 40) gives in detail the measures he recommends for the control of endemic cholera in rural Bengal.

Bose and Chakraborty (p. 827) have shown that if copper foil is placed in water, the latter very soon becomes lethal to *V. cholerae*. The same is true if water is stored in clean copper vessels and the authors suggest that this should be done for 4–6 hours during epidemics. *Charles Wilcocks*

MALARIA

Fairley, N. H. **Malaria ; with special reference to certain Experimental, Clinical, and Chemotherapeutic Investigations. Lecture I : The Life Cycle. Lecture II : Chemotherapy.** *Brit. Med. J.* 1949, Oct. 15 & 22, 825–30 ; 891–7. [38 refs.]

These are the Croonian Lectures delivered at the Royal College of Physicians of London. The first lecture summarizes in masterly fashion the large additions to knowledge acquired during the last decade regarding the life cycle of malaria parasites, human, avian and monkey, with special reference to tissue-phase parasites. The list of references cites all the important contributions that have been made.

In the second lecture, recent developments in the treatment of malaria are described. The specific action of antimalarial drugs, both old and new, against the different stages of development in the life cycle of the human parasites are fully dealt with. The variations in the sensitivity of different strains of the same species of parasite towards a given antimalarial drug are well exemplified. The lecture is a most interesting summary of a subject to which the author's own contributions have been outstanding. *Norman White*

GABALDON, A. **The Nation-Wide Campaign against Malaria in Venezuela.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1949, Sept., v. 43, No. 2, 113–60, 17 figs. [23 refs.] Discussion 161–64 [MACDONALD, G.; BENTLEY, C. A.; AROCHA, M.; MANSON-BAHR, P.; GARNHAM, P. C. C.; SHORTT, H. E. (President); GABALDON (in reply)].

Venezuela has a population of just under four millions and an area of 912,050 square kilometres. Twenty per cent. of the population are white, 8 per cent. negro, 7 per cent. Indian, and 65 per cent. mixed. The country falls naturally into three zones: the Costa-Cordillera, Llanos, and Guayana. The Costa-Cordillera is the coastal plain backed by a mountain range. Though it comprises only 18 per cent. of the total area it contains 77 per cent. of the population. Llanos, with 36 per cent. of the area and 20 per cent. of the population, lies between the mountain range and the Orinoco. There are numerous rivers liable to flood and between them pools, ponds and lagoons afford abundant facilities for mosquito breeding: Llanos is the most malarious of the three zones. Guayana with 46 per cent. of the area but only 3 per cent. of the population, lies south of the Orinoco. It also has numerous rivers; the water of many of these has sufficiently high acidity to prevent the breeding of *Anopheles darlingi*, and in consequence much of the country is free from malaria.

Rainfall increases from north to south (average 39 to 79 inches). There is generally a mid-year wet season. The malaria transmission season is determined by rainfall.

The population has increased from 2,546,425 to 3,971,213 in the last 30 years. A special malaria service was established in 1936: the author has been in charge of it since its beginning.

Twenty-nine species of *Anopheles* have been found in Venezuela; these are listed. Only two of them have been incriminated as malaria vectors, *A. darlingi* and *A. albimanus*. Possibly *A. pseudopunctipennis* is a vector of secondary importance in the mountains. Both vectors transmit malaria in the Costa-Cordillera; in the other two zones *A. darlingi* is the only vector. *A. albimanus* can breed in water with a 1·7 per cent. saline content. *A. darlingi* breeds only in fresh water. *A. darlingi* is markedly anthropophilic; *A. albimanus* much less so. The mean sporozoite index of *A. darlingi* was 0·9 and of *A. albimanus* 0·6 per cent. The seasonal density of both vectors closely followed the rainfall, but even in the dry season some are found inside houses.

All degrees of malaria endemicity were to be found in Venezuela. *P. falciparum* was the predominant species of parasite at all ages over 5 years: below this age *P. vivax* infections were in slight excess. *P. malariae* infections were much less frequent. Malaria mortality rates have shown a marked decline since 1920, most marked in Llanos. This fall coincided with a marked improvement in the standard of living of the people.

Annual malaria death rates exhibited a five-year periodicity cycle. The annual monthly malaria incidence curve had only one peak in areas with only one peak in the rainfall. The *P. falciparum* peak occurred later than the *P. vivax* peak: the decline of the former was steeper than that of the latter. During the season of reduced transmission there was no clearly marked *P. vivax* relapse wave. There was no period of interrupted transmission of any species.

Since the end of 1945 DDT house-spraying has been used on a nation-wide scale. All areas which can be reached by car have been sprayed. DDT squads have been organized in different ways, to work from trucks, motor-boats, wheel-barrows, trolleys, horses or on foot. In 1949 the staff included 1,561 persons —19 physicians; 9 engineers; 2 entomologists; 2 chemists; 13 administrators;

1 meteorologist ; 36 malaria inspectors ; 17 topographers ; 11 DDT inspectors ; 98 urban and rural visitors ; 135 draughtsmen, photographers, clerks and laboratory technicians ; 59 squad leaders ; 373 sprayers ; 106 drivers ; 5 pilots ; 49 other skilled workers ; 626 unskilled workers. A 5 per cent. solution of DDT in kerosene is used in the relatively few painted houses ; suspensions are used in most others, and have been found to be more active for longer periods than solutions or emulsions. The dose applied approximates 2 gm. per square metre.

All houses in malarious areas are treated. The whole interior of all houses, stables, latrines and other shelters is sprayed, including verandahs, eaves and the under-surface of furniture. During 1946 spraying was repeated every three months ; in 1947 and 1948 every four months ; in 1949 every six months ; in 1949 the dose of DDT was doubled (to 200 mgm. per square foot). The budget provision for the work in 1948–49 was Bolivars 5,600,000. The total expenditure of the Division of Malariology represented in that year a *per caput* expenditure of Bs. 2·81 (U.S. $0·84). In 1948 the number of houses sprayed was 168,472 and the number of persons directly protected 863,498.

Numerous examples are given of the results of this prodigious effort. The whole picture of malaria in Venezuela has radically changed. *A. darlingi* seems to be in the process of eradication, from large zones ; transmission by *A. albimanus* has been intercepted. Wherever DDT has been applied malaria has subsided. The general health indexes of the country have improved. The prospect of total eradication of malaria from the most important regions is contemplated. The malaria death-rate fell from an average of 112·2 in the period 1941–1945 to 14·8 in 1948. The paper was followed by a discussion in which six speakers took part. *Norman White*

NAUCK, E. G. Die epidemiologische Bedeutung der Malaria auf Grund von Erhebungen in Westdeutschland. [**The Epidemiological Significance of Malaria based on Records in Western Germany.**] Reprinted from *Deut. Gesundheitswesen.* 1949, v. 4, No. 13, 571–7, 11 figs.

Certain parts of Western Germany must be regarded as " endemic centres " of malaria and from these the infection is, for the present at least, irremovable ; on the other hand the danger of extension thence must not be exaggerated. In spite of the introduction of many carriers during the recent war, the residual amount of malaria has not greatly increased. Three districts are specially mentioned: East Friesland, particularly around Emden, where in 1943 there were introduced 400 prisoners-of-war from Macedonia, with a parasitic index of 9 per cent., nevertheless there was no obvious increase. In Schleswig-Holstein the tale was different, for here after the war there was an influx of latent infections, parasite-carriers and relapse cases. Spot-maps, charts and tables show the prevalence of autochthonous and introduced and relapsing cases for the three years 1945, 1946 and 1947. Autochthonous cases numbered 105, 167 and 157 ; introduced cases 12, 161 and 27 ; unidentified 20, 62 and 46, and relapse cases 27, 225 and 306 respectively. In Hamburg, in the same year, autochthonous cases were 15, 62 and 11, of extraneous origin 22, 36 and 23, and relapses 97, 27 and 40 respectively. A spot-map indicates the chief breeding-sites of *Anopheles* in Hamburg.

Attempt has been made to obtain as accurate figures as possible, but irregularity of returns deprives them of some statistical value, though in some districts sufficient are obtained for drawing a fairly accurate inference. Further efforts will be needed to acquire more correct notifications, to detect carriers and to combat the breeding of mosquitoes, but there is every hope that success will attend these efforts and that malaria infection will become much less over the whole of Germany. *H. Harold Scott*

SOLETTA, L. Reviviscenza della malaria primitiva in relazione al periodo bellico. [**Reappearance of Primitive Malaria as a Result of War Conditions.**] *Ann. d. San. Pubblica.* Rome. 1948, Nov.–Dec., v. 9, No. 6, 1772–84. [17 refs.] English summary.

During the three years 1943–45 ten cases of malaria were reported to the Provincial Sanitary Office of Parma and were investigated : they form the subject of this report.

All the cases occurred in areas which had long been free from endemic malaria. None of the patients had been in any recognized malarial locality. *P. vivax* was found in every case. Gamete carriers were found among soldiers returned from endemic areas. *Anopheles maculipennis typicus* and *messeae* were found in connexion with each case. The author believes that *A. maculipennis messeae* was responsible for transmission. The number of cattle had been greatly reduced, owing to the war, with the result that this normally zoophilic species was deviated towards man. *Norman White*

HEISCH, R. B. & HARPER, J. O. **An Epidemic of Malaria in the Kenya Highlands transmitted by** *Anopheles funestus.* *J. Trop. Med. & Hyg.* 1949, Sept., v. 52, No. 9, 187–90.

An epidemic of malaria occurred in 1948 in the Kericho Highlands of Kenya. Dispensary figures indicated a rise in fever incidence in February, with a maximum in April ; the earlier cases were probably due to some agent other than the malaria parasite. The parasite rate in May was 36 per cent. ; by August it had fallen to 20 per cent. The predominant parasite was *P. falciparum.* The *P. malariae* rate was 2·6 per cent. and the *P. vivax* rate was 3·0 per cent. during the epidemic. All rates were highest in children between 1 and 15 years.

Previous epidemics in this district have occurred later in the year, the peak month being July and August, and the vector has been *Anopheles gambiae.* In this epidemic, the epidemic was early and was thought to be due to *A. funestus. A. gambiae* was extremely scarce in huts and no infected specimens were found ; *A. funestus* were more numerous (though never exceeding two per hut) and 2·5 per cent. had sporozoites in the salivary glands.

This is a fairly definite example of an epidemic of malignant tertian malaria transmitted by *Anopheles funestus.* *P. C. C. Garnham*

BLANC, F. & LANGUILLON, J. A propos des formes exoerythrocytiques de l'hématozoaire de Laveran. [**Exo-Erythrocytic Forms of Malaria Parasites.**] *Méd. Trop.* Marseilles. 1949, May–June, v. 9, No. 3, 336–48, 16 figs. on 4 pls. [69 refs.]

A brief account is given of the problem of exo-erythrocytic schizogony in malaria, culminating in the discoveries first of the avian and later of the mammalian forms. The authors point out that the systematic histological study of all tissues will be necessary before the liver parenchyma cell can be accepted as the sole site of exo-erythrocytic schizogony in mammalian malaria. These authors in fact recognize the following forms as exo-erythrocytic parasites :—

1. Non-pigmented schizonts free in the bone marrow.
2. Non-pigmented schizonts of piroplasm type free in the marrow.
3. Pre-segmenters free in the marrow.
4. Parasites lying within reticulo-endothelial cells (" histiozoa ").
5. " Blue bodies " in endothelium of brain, etc., and in liver parenchyma.

Fourteen patients were studied by means of sternal marrow puncture. Thirteen from Indo-China had chronic benign tertian malaria, and in spite of mepacrine prophylactic treatment, still showed parasites in the blood, and one was a convalescent from blackwater fever from Madagascar, who had had a mixed infection. Minute examination of the marrow smears revealed exo-erythrocytic parasites in six cases including the one of blackwater fever. Nearly 50 parasites were encountered, including small forms with one or two nuclei and larger bodies up to 13 μ in diameter with a maximum of 57 nuclei. None of them had pigment; three others were discovered with pigment, resembling the old pictures of parthenogenesis of a macrogametocyte. [The authors appear reluctant to abandon the latter "regression" hypothesis, which has never been entirely disproved.] The significance of these marrow parasites remains unknown, their relation to the other forms found in the vertebrate host is indicated, but a final assessment must await further histological observations. *P. C. C. Garnham*

GALLAIS, P., CROS, R. & CAPPONI, M. Les stades exo-érythrocytiques du paludisme humain et la moelle osseuse étudiée en frottis. Analyse de 104 prelevements. [**Exo-Erythrocytic Stages of Human Malaria and Study of 104 Marrow Smears.**] *Méd. Trop.* Marseilles. 1949, May–June, v. 9, No. 3, 307–35, 5 coloured pls. [44 refs.]

This is a study of certain forms of malaria parasites found in the bone-marrow of patients in Indo-China, and it is accompanied by a commentary on their possible relationship to exo-erythrocytic schizogony and the relapse phenomenon. Eighty-four people were investigated, 69 showed clinical signs of malaria or were presumed to be in a state of malarial latency, but only 37 of the total actually exhibited parasites in the peripheral blood. They lived in a hyperendemic zone and included both Europeans and indigenous natives. In spite of chemoprophylaxis, their symptoms were manifold but usually the spleen was enlarged. The object of the work was to see if examination of the bone marrow would reveal the hidden source of the parasites responsible for the chronic or latent disease and the nature of the possibly exo-erythrocytic parasites. The authors felt that it was very probable that the liver cell was not the sole site of exo-erythrocytic development of the parasite in man, particularly in the case of *P. falciparum* which had such a varied erythrocytic life.

Bone marrow was obtained by puncturing either the sternum or the iliac crest with a Mallarmé's trochar. After slow aspiration, the contents were blown on to a slightly tilted slide, when the white grains of marrow became clearly visible. These grains were broken up by a cover-slip and the smear was completed (usually enough material for five slides was obtained): 104 punctures were made on the 84 cases. At least five hours were devoted to the examination of slides from each case and the following criteria were employed in assessing the nature of Romanowsky-stained bodies thought to be of a parasitic nature; a more or less intense blue cytoplasm in contrast to that of host cells, a ruby-red nucleus of regular outline, and a general resemblance to described forms. Exo-erythrocytic parasites were always non-pigmented and extracellular; they were found in 15 of the cases (22 per cent.). There were two morphological types, vacuolated parasites with one or two nuclei and often drawn out so as to give an impression of movement, and multi-nucleated forms (3 to 40 nuclei) resembling the "blue bodies" of avian or mammalian malaria, not more than twice the size of an erythrocyte.

The authors give reasons why these parasites are neither erythrocytic forms artificially separated from the corpuscles during spreading, nor disintegrated

fragments of marrow cells or other artefacts. They were never found in non-malarial patients. The authors think that the parasites were originally within reticulo-endothelial cells, but became detached while the smear was being made. They conclude by stating that the exact significance of these marrow parasites is unknown, and that further study by means of histological methods of biopsy specimens would alone be capable of giving an answer.

[It is difficult to estimate the significance of these results. Somewhat similar parasites have been described by RAFFAELE [this *Bulletin*, 1938, v. 35, 514], BRUG [*ibid.*, 1942, v. 39, 263] and many others, and it thus seems highly probable that non-pigmented exo-erythrocytic malaria parasites exist in the bone marrow. But are they part of a special biological cycle ? The discoveries in connexion with the liver schizonts in mammalian malaria provide a clear explanation of most of the problems, and it seems hardly necessary to seek further afield in the bone-marrow or capillary endothelium of various organs although the existence of still another cycle in such places cannot be excluded. A possible interpretation of the marrow parasites is that in the stagnant backwater of the marrow, a few merozoites from a normal schizont escape into the plasma, fail to penetrate erythrocytes and manage to undergo extracellular growth resulting in deformed and vacuolated parasites. Such a phenomenon is sometimes observed in cultures of *Plasmodium*. If this interpretation were true, then these parasites could be regarded as being of an accidental nature outside the normal life history of the organisms.] *P. C. C. Garnham*

FIELD, J. W. **The Morphology of Malaria Parasites in Thick Blood Films. The Form and Distribution of Pigment. Part V.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1949, July, v. 43, No. 1, 49–56, 7 figs.

Malaria pigment assumes distinctive patterns, and such characteristics may be used for diagnosis of species. The importance of colour differences is slight as these are thought to be related less to the special characters of the pigment than to various extrinsic factors such as the optical system (*e.g.*, a badly adjusted condenser or a blue filter darkens the pigment) or the concentration factor (the fused lumps are much darker in colour). The characters of the pigment are best observed in lysed, unstained thick films of blood. For full details the reader is advised to consult the original paper and diagrams but the main characters may be summarized as follows :—

Plasmodium falciparum : Pigment appears early, a few hours before the rings recede to the internal organs. It soon concentrates and a fused mass is eventually formed. This solid fusion does not occur in the other species. The presence of coarse lumps of pigment in phagocytes is also of diagnostic value.

Plasmodium vivax : Pigment first appears as delicate rodlets which later show little tendency to coalesce ; the elongate granules remain discrete.

Plasmodium malariae : Pigment formation begins very early, but the granules concentrate very late and to a less degree than the other species. They are round rather than elongate and often show a peripheral distribution.

The pigment of gametocytes does not concentrate except to some extent in mature crescents ; there is no marked difference in its character in the two sexes in any of the three species. *P. C. C. Garnham*

HESS, A. D. & CROWELL, R. L. **Seasonal History of *Anopheles quadrimaculatus* in the Tennessee Valley.** *J. National Malaria Soc.* 1949, June, v. 8, No. 2, 159–70, 7 figs.

" A summary is made of observations on the seasonal history of *A. quadrimaculatus* which have been made in the Tennessee Valley during the past fifteen

years. In the region of North Alabama, this mosquito passes the winter as inseminated adult females which hibernate in caves and similar resting places. The mosquitoes begin to appear in the caves during October, reach a peak in late November, and disappear by the first part of February. Adults may emerge during periods of warm weather at any time of the winter to take blood meals but do not develop eggs until they leave the caves in early February. The first eggs are deposited during the latter part of February or the first part of March and the first brood of adults emerges during April. The first occurrence of adults in significant numbers in inspection stations usually coincides with the emergence of the second brood of adults. Peak productions occur from the middle of June until the middle of August, and adult densities usually reach insignificant numbers by the end of September.

" Temperatures during February and March are shown to have an important effect upon the extent of mosquito production during the subsequent breeding season. This is a critical period in the seasonal history of the species and above-normal temperatures favor heavy production, whereas below-normal temperatures result in light production during the following season. This relationship may make it possible to forecast the degree of production to be expected a month ahead of the period when control operations are initiated.

" The fall decline in adult densities of *A. quadrimaculatus* appears to be due to a decrease in extent of aquatic habitat suitable for mosquito breeding rather than to unfavourable temperatures."

CHOW, C. Y. **The Identification and Distribution of Chinese Anopheline Mosquitoes.** *J. National Malaria Soc.* 1949, June, v. 8, No. 2, 121–31. [15 refs.]

PAESI, F. J. A. **Observations on 'Healthy' Human Carriers of** *Plasmodium vivax*. *Antonie van Leeuwenhoek: J. Microbiol. & Serol.* 1944–45, v. 10, Nos. 3/4, 77–92, 4 figs.

The symptomless carrier of *P. vivax* is of great importance in the epidemiology of malaria in the Netherlands. The vector subspecies of *A. maculipennis* has a limited period of transmission activity, from the middle of August to the end of October. Febrile attacks of malaria are rare at this season; clinical attacks of malaria are most frequent from May to August. Autumnal infections generally exhibit an incubation period of about nine months. In 1940 and 1941 a study was made of the malaria parasites in " healthy " carriers in a suburb in the extreme north of Amsterdam. During the prolonged period of incubation very few or no parasites can be found in the blood till a very short time before the clinical attack. In persons who had suffered from clinical attacks of malaria a certain periodicity was noted about the appearance of parasites in the peripheral blood; periods during which blood examinations were negative and positive each averaged about 12 days. Very few or no parasites were found in the blood of most carriers, a year after the onset of the disease. An exception was a boy of eight years whose spleen had been removed: he had his first attack of malaria two months after the operation. He continued to harbour parasites for three and a half years; the blood test in his case was never negative.

Persons harbouring as many as 2,400 parasites per 6,000 leucocytes may have no subjective feelings of ill-health. *Norman White*

BERGERET, C. Note sur les formes cérébrales du paludisme de l'enfant. [**Cerebral Malaria in Children.**] *Bull. Méd. de l'Afrique Occidentale Française.* 1948, v. 5, No. 2, 281–3.

Cerebral malaria resulting from infection with *Plasmodium falciparum* is very common at Dakar in African children up to the age of five and may arise

without any prodromal symptoms. As a rule, in the absence of very early treatment, the child is brought to hospital in a state of coma. Conjugate deviation of the head and eyes is often seen and the temperature is usually between 39° and 40°C., while a correlation between the respirations and convulsions has been observed, as if the impact of air on the surfaces of the bronchi and alveoli causes a paroxysmal response. A transitory hemiplegia, monoplegia or ophthalmoplegia is not uncommon.

Lumbar puncture always gives a clear fluid, usually under tension with a slightly increased cell count, the protein content remaining normal. *Ascaris* infestation has been frequently found in this type of case and the author suggests that this may be a predisposing factor in causing the cerebral symptoms. The difficulty in finding parasites in the peripheral blood in the first 48 hours is stressed and puncture of the tibia, which is not difficult in infants, is suggested as a means of early diagnosis.

The following conditions, common in West Africa, must be kept in mind in making a diagnosis—infantile polio-encephalitis, vaccinial encephalitis, acute meningitis either bacterial or due to a virus infection, spirochaetal encephalomeningitis, meningitis due to pneumonias or *Ascaris* infestation. Lumbar puncture together with examination of the peripheral blood and, if necessary, of the bone marrow from the tibia, enable a diagnosis to be made. Injection of a few cc. of air into the spinal canal has been frequently performed apparently with good results in bringing about a diminution of the convulsions.

Treatment was by intramuscular injections of quinine (quinoform) in the following dosage: under one year, 0·25 gm. in the 24 hours; one to two years 0·5 gm., two to six years 0·75 gm., this being continued for five days and combined with one or two tablets of quinacrine (mepacrine] according to age; it is essential to treat any infestation with *Ascaris* as soon as the patient's condition permits. *C. F. Shelton*

STAUB, H. Neueres über Biologie und Chemotherapie der Malaria. [**Advances in the Biology and Chemotherapy of Malaria.**] *Schweiz. med. Woch.* 1949, Sept. 24, v. 79, No. 38, 908–14, 2 figs. [46 refs.]

The author has summarized the development of the more important antimalarial drugs from the time of the discovery of plasmoquine, for which patents were taken out in Germany as early as 1924. The biology of malarial parasites is also discussed in connexion with researches on the exo-erythrocytic cycle by such well-known workers as RAFFAELE, JAMES and others, including SHORTT and his co-workers, who recently described this cycle for the first time in primates. Tribute is paid to the researches carried out in Britain and America during the late war in the effort to find new and more potent antimalarials. In the latter country the 4-aminoquinolines sontochin (SN 6911) and chloroquine (SN 7618) along with pentaquine (SN 13,276), a drug of plasmoquine type, were probably of greatest importance. The two former had been prepared and patented in Germany before 1939 but had not been thoroughly investigated on the clinical side. Paludrine [proguanil] is deservedly hailed as the chief British contribution in this field of research and its extensive trial by FAIRLEY and his collaborators is adequately described. [The author has probably not had the opportunity of reading the more recent accounts of the difficulties met with in the treatment of certain malarial strains with paludrine and the development of drug-resistance in these parasites.] He deals briefly with his own observations on another biguanide synthalin, in 1927, which was endowed with bacteriostatic and trypanocidal properties. Details of dosage schedules for a number of the new drugs are quoted, with references, from the literature [similar short articles by COATNEY, this *Bulletin*, 1949, v. 46, 702, and by

Cooper, *ibid.*, 1109, have recently been reviewed in this *Bulletin*]. While there is nothing new in the present article it gives a clear picture of the progress achieved in malarial chemotherapy and in biological studies of the parasites during recent years. There are errors in the constitutional formulae of atebrin [mepacrine], sontochin and certuna as given. *J. D. Fulton*

Covell, G. **The Treatment of Malignant Tertian Malaria.** *Brit. Med. J.* 1949, Oct. 8, 773–7. [12 refs.]

This paper, read at the Annual Meeting of the British Medical Association, 1949, contains an excellent summary of the modern treatment of *falciparum* malaria. Emphasis is laid on the importance of differentiating this disease from many others that it may simulate closely. Illustrative cases are described. The disease may have an insidious onset; the paroxysm is very often ill-defined and rigors are exceptional; in the absence of specific treatment pernicious symptoms may develop with little or no warning. In a primary case parasites in the peripheral blood may be so few that they escape detection in a blood smear.

Antimalarial drugs may act in four possible ways: against the pre-erythrocytic phase of the parasite; against the asexual parasites in the erythrocytic stage; against the sexual parasites in their erythrocytic phase; or against the hypothetical tissue phase of the parasite to which latency and late relapse in *P. vivax* malaria have been attributed. This last stage does not occur in *P. falciparum* infections.

The only drugs at present available which exert a true causal prophylactic action against *falciparum* malaria, acting on the pre-erythrocytic phase of the parasite, are the biguanides, of which proguanil [paludrine] is best known. The prophylactic dose of proguanil is 100 mgm. daily for non-immune persons, and 300 mgm. once a week for the indigenous inhabitants of malarious countries.

Schizonticidal drugs used for prophylaxis include quinine, 10 grains daily; mepacrine, 100 mgm. daily; chloroquine, 300 mgm. of the base in a single dose weekly; camoquin, 500 mgm. weekly. Quinine was relatively ineffective against New Guinea strains of *P. falciparum*. Its prolonged administration produces unpleasant side-effects. Its association with the precipitation of blackwater fever makes it undesirable as a suppressant. Mepacrine is a very effective suppressant of *falciparum* malaria provided it is taken for 14 days before exposure to infection and continued for one month after leaving the endemic area. Mepacrine has disadvantages: during the early days of treatment nausea and abdominal discomfort are not uncommon; headache, insomnia and giddiness may also occur at this stage but are less frequent; a proportion of persons develop a lichenoid dermatitis after prolonged ingestion of the drug; yellow discoloration of the skin is comparatively common. Chloroquine acts in a manner similar to mepacrine but it is less toxic and does not discolour the skin. The same advantages are claimed for camoquin. The choice of a drug for prophylactic use lies between proguanil and either chloroquine or camoquin. The very low grade toxicity of proguanil makes it suitable for widespread distribution to labour forces, etc.

Different strains of *P. falciparum* from different parts of the world vary widely in their response to treatment with the same antimalarial drug. It is therefore unwise to be dogmatic about the most effective treatment of the clinical attack. A treatment favoured by the author consists of proguanil 300 mgm. twice daily for 10 days reinforced with 900 mgm. of mepacrine given in three doses on the first day of treatment. Such treatment is likely to produce rapid alleviation of clinical symptoms, a high rate of radical cure, sterilization of gametocytes, with minimal risk of injurious side-effects. Reinforcement of the proguanil

course with chloroquine or camoquin instead of mepacrine might be even more effective. Whatever treatment is adopted for the clinical attack it should be followed with a maintenance dose of proguanil (100 mgm. daily), or of chloroquine or camoquin (100 mgm. weekly), for six weeks, during which period recrudescences are most likely to occur.

For pernicious forms of malignant tertian malaria, when the patient is unable to take drugs by mouth, the intravenous injection of 10 grains of quinine dihydrobromide or dihydrochloride, in 20 ml. of normal saline, injected very slowly, not more than 2 ml. per minute, is recommended. This may be repeated in six to eight hours if necessary. Good results have been obtained with mepacrine, with chloroquine, and with camoquin, given intramuscularly. Should no drug suitable for intravenous or intramuscular medication be available 15 to 30 grains of quinine sulphate mixed with starch paste thin enough to run through a rectal catheter, may be given per rectum. As soon as the patient is able to take drugs by mouth all further drugs should be given orally.

Norman White

Seaton, D. R. & Adams, A. R. D. **Acquired Resistance to Proguanil in *Plasmodium falciparum*.** *Lancet.* 1949, Aug. 20, 323–4.

A West African strain of *Plasmodium falciparum* was isolated from a patient who had been taking proguanil intermittently before coming for hospital treatment. It was maintained in a series of neuro-syphilitics by blood passage, each patient receiving a dose of proguanil insufficient to abolish parasitaemia. This initial treatment was followed by a ten-day course of the drug. By the seventh passage the strain was unaffected by proguanil, the parasitaemia persisting throughout treatment ; by the tenth passage the strain was resistant to doses of 1,000 mgm. daily for ten days. A mosquito (*A. stephensi*) infection of the resistant strain (eleventh and twelfth passage) was obtained with some difficulty ; the sporozoites were inoculated intravenously into a patient and an attack of malaria followed ten days later. Heavy and prolonged doses of proguanil failed to eliminate the parasitaemia, and two recrudescences occurred. Thus drug resistance was retained after passage through the mosquito. Other anti-malarial drugs (*e.g.*, mepacrine) quickly cured these proguanil-resistant infections. It is thought unlikely that such strains will arise naturally (*i.e.*, in the field) because proguanil possesses such a highly sterilizing action on the gametocytes.

P. C. C. Garnham

Field, J. W. & Edeson, J. F. B. **Paludrine Resistant Falciparum Malaria.** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1949, Sept., v. 43, No. 2, 233–6, 3 figs.

This letter refers to a suggestion made by Fairley [this *Bulletin*, 1949, v. 46, 1111] that the difference of reaction to paludrine [proguanil] exhibited by New Guinea and West African strains of *P. falciparum*, respectively, might be related to geographical isolation : New Guinea lies east of the Wallace Line. In Malaya, which lies to the west of that Line, *falciparum* infections were, three years ago, as sensitive to paludrine as New Guinea infections : a single tablet of 100 mgm. was enough to obtain clinical cure. But in the first half of 1949, in one locality in the State of Negri Sembilan, one out of every four cases treated with from two to three times this dose failed to respond. The patients were drawn from a population which for two years had been given paludrine as a prophylactic. In one recent case reported more than a hundred times the above dose failed to clear the blood of parasites for more than a few days.

In Malaya as a whole paludrine is still being used as a suppressive with marked success. Will paludrine resistance progress elsewhere until the drug fails to be a useful schizonticide in *falciparum* malaria ? This is the disquieting possibility to which the writers direct attention. *Norman White*

FINDLAY, G. M. **Investigations in the Chemotherapy of Malaria in West Africa. VI. Suppressive Cure of Malaria by Sulphonamides.** *Ann. Trop. Med. & Parasit.* 1949, Apr., v. 43, No. 1, 1–3.

In West Africa from 1942 until the end of 1944 a field experiment was carried out with European members of army units ; one group were given mepacrine 0·6 gm., and after 1943, 0·7 gm., weekly ; the other group were given 0·5 gm. daily of one or other of three sulphonamides, sulphapyrazine, sulphamethazine, or sulphamerazine. The results, calculated as the number of attacks of malaria per 365 man-days of exposure are given in tabular form :—

Drug	No. of persons on sulphonamide	No. of man-days of exposure on sulphonamide	No. of attacks of malaria	No. of attacks per 365 man-days' exposure	No. of persons on mepacrine	No. of man-days of exposure on mepacrine	No. of attacks of malaria	No. of attacks per 365 man-days' exposure
Sulphapyrazine	141	23,569	7	0·11	232	53,271	41	0·28
Sulphamethazine	178	26,752	17	0·23	352	52,740	37	0·25
Sulphamerazine	122	9,640	12	0·45	346	25,954	12	0·16

Sulphapyrazine gave results superior to those with mepacrine. This prompted a second experiment carried out throughout 1944 with the members of a single unit. One hundred and twenty-nine persons took mepacrine 0·1 gm. daily and had 34 attacks diagnosed as malaria (parasites found in only 20). One hundred and two persons took sulphapyrazine 0·5 gm. daily and had seven attacks diagnosed as malaria (parasites found in only one). The case incidence per 365 man-days, exposure was for mepacrine 0·327, and for sulphapyrazine 0·092. If only proved attacks of malaria be taken into account these incidence rates become mepacrine 0·192, sulphapyrazine 0·013. The total blood concentration of sulphapyrazine never fell below 0·90 mgm. per 100 ml. of blood.

There was complete absence of toxic reaction to sulphapyrazine ; no one abandoned the drug as a suppressive.

In acute attacks of *falciparum* malaria sulphapyrazine is relatively ineffective. Its action is probably limited to the early stages of schizogony. In view of doubts whether proguanil is of great value as a suppressive against all African strains of *P. falciparum*, further investigation of the action of sulphonamides in effecting cure of *falciparum* infection might well be of interest.

Norman White

DEONIER, C. C., SULLIVAN, W. N., NOTTINGHAM, E. & LINDQUIST, A. W. **Control of *Anopheles* Mosquitoes with Coarse and Fine DDT Sprays applied by Airplane.** *J. Econom. Entom.* 1949, June, v. 42, No. 3, 447–50.

Control of *Anopheles quadrimaculatus* by fine and coarse sprays of DDT applied by aeroplane was investigated in 1945 by the American Army Air Force in Florida, U.S.A.

The fine spray, droplet size 50 to 65 microns, was produced through the exhaust venturi ; the coarse spray, droplet size 150 microns, was produced by a simple gravity fed straight discharge pipe. The solution contained 20 per cent. DDT (wt./vol.) and was prepared by adding fuel oil to a solution containing 40 per cent. DDT in an oil (chiefly methyl and polymethyl naphthalenes). Three areas were sprayed three times at intervals of one month ; two at the rate of 0·3 pounds DDT (1·5 pints) per acre and the other at 0·6 pounds (3 pints) per acre. Mosquito counts were made before spraying and daily throughout the period of investigation ; dipping for larvae was also done before spraying and then weekly afterwards.

Results showed that both fine and coarse sprays were effective for 10–14 days against adult mosquitoes, producing respectively, reductions of 98 and 99 per cent. and there was excellent control of larvae. The fine sprays killed quicker but did not give so heavy a deposit as the coarse sprays. It is likely that the dosages were too heavy and further tests will have to be made with lighter ones. *H. S. Leeson*

For review of a booklet entitled **Malaria and Mosquito Control** see p. 101.

RIGDON, R. H. & RUSKIN, A. **Lethal Effects and Electrocardiographic Changes produced by Quinine Dihydrochloride in Malaria-Infected Monkeys.** *J. Lab. & Clin. Med.* 1949, Aug., v. 34, No. 8, 1109–1117, 4 figs. [10 refs.]

In the preceding paper [above] the authors have shown that the electrocardiograms of normal and malaria-infected monkeys do not differ appreciably. The lethal effects of quinine dihydrochloride and its influence on the electrocardiograms of normal animals and those infected with *P. knowlesi* has now been investigated in a small number of animals. The drug was given intravenously in doses of 20·6 to 82·8 mgm. per kilo to the uninfected host, the maximum amount tolerated being about 55 mgm. per kilo and about half that amount was tolerated in infected animals in which parasitaemia was heavy and anaemia marked. Respiratory embarrassment, cyanosis, convulsions and death frequently followed injection of the larger doses. The animals which survived appeared to be normal some hours later. The electrocardiographic effects were apparent soon after injection and differed in degree rather than in kind in infected and uninfected hosts. Return to normal was fairly rapid except that the length of the Q-T interval was occasionally prolonged for some time. Similar doses of quinine produced more marked changes in infected than in normal animals and appeared to be more closely associated with the degree of anaemia present than with any other factor. The relation of anaemia to the effects produced by quinine is being further studied. *J. D. Fulton*

MCGHEE, R. B. **The Course of Infection of *Plasmodium lophurae* in Chick Embryos.** *J. Parasitology.* 1949, Aug., v. 35, No. 4, 411–16, 3 figs. [12 refs.]

Chick embryos of different ages were inoculated intravenously with standard amounts of blood containing *Plasmodium lophurae*. The course of infection in the embryos was followed by examination of blood smears taken daily from a large allantoic vein. Even the smallest inoculum produced a high density of infection which invariably led to death ; larger doses merely killed the embryos more quickly. In the first passage there was a preliminary drop in numbers of parasites, but later the rise in parasitaemia was steady and rapid from the start, a notable feature being the great uniformity in the infections under similar

conditions. There was a complete absence of any crisis. The blood of the youngest embryos contains normally 38 per cent. of immature cells ; such cells (particularly the primitive erythroblasts) are often invaded by the parasites which then show an abnormal morphology (*e.g.*, vacuolation of the cytoplasm). It is thought that these parasites sometimes fail to develop properly, and thus blood containing a high percentage of primitive cells (as in the youngest chicks) will exhibit a lower rate of parasitaemia than blood with more mature constituents. *P. C. C. Garnham*

Torrey, J. C. & Kahn, M. C. **Precipitin-Tests in** *Plasmodium lophurae* **Malaria.** *J. Immunology.* 1949, May, v, 62, No. 1, 41–8, 10 figs. [16 refs.]

Earlier work on the presence of precipitins in malarial serum has been inconclusive, a common source of difficulty being the instability of the antigens used in tests.

The preparation of antigens by two methods from the blood cells of ducks infected with *Plasmodium lophurae* is described. Both gave specific precipitin reactions but proved unstable for longer than 20 days.

An antigen was then prepared from blood plasma of infected ducks by an acid precipitation method. The precipitation was carried out in two stages, the *p*H of the second antigen being 3·2–3·6. This proved the more potent and stable antigen. The reactions obtained with this showed clear-cut readings and normal sera gave negative results. A method of employing this antigen in collodion particle agglutination tests is described.

The general results of the investigation went to show that precipitin formation follows the onset of parasitaemia, that precipitins persist in the blood of ducks which recover for one to two weeks only and that while recovery was always associated with precipitin formation, the latter was not always followed by recovery. *H. E. Shortt*

Geigy, R. & Rahm, U. Testen von Antimalaria-Mitteln an *Plasmodium gallinaceum* im Darm von *Aedes aegypti*. [**Tests of Antimalarial Drugs on** *Plasmodium gallinaceum* **in the Gut of** *Aëdes aegypti*.] *Acta Tropica.* Basle. 1949, v. 6, No. 2, 153–7, 4 figs.

This study is devoted to tests on the effect of antimalarials on the developmental stages of *P. gallinaceum* in *Aëdes aegypti*. Normally about 95 per cent. of the mosquitoes became infected after feeding on the blood of a fowl harbouring gametocytes. The development of the parasite proceeds as follows at 26°C. and 85 per cent. relative humidity. Exflagellation of microgametes, fertilization of macrogametes and formation of oökinetes take place within the first 12 hours after the infection. Shortly afterwards the oöcysts are produced and can be easily recognized on the surface of the stomach from the fourth day onwards. On the ninth or tenth day the oöcysts rupture, releasing the sporozoites into the body-cavity, whence they penetrate into the salivary glands, in which they are invariably present from the twelfth day.

The compounds to be tested were mixed with honey water, which was given as food to the female mosquitoes in the intervals between blood meals. It is noted that, while the blood finds its way directly into the stomach, other fluids taken up by the mosquito are first stored in the crop. Using this technique, the authors tested the effect of drugs on the gametes and oökinetes, on the one hand, and on the oöcysts, on the other hand. In the former case, newly-hatched mosquitoes, which had fasted for 48 hours, were allowed to feed for two days on honey water containing various concentrations of the drug, after which they were starved for two days. They were then placed on an infected chicken

harbouring numerous gametocytes. The fed mosquitoes were isolated in glass jars provided with pure honey water, where they were kept for seven days, after which they were dissected and the stomach examined for the presence of oöcysts. The absence of oöcysts provided evidence of the efficacy of the drug, the presence of small numbers indicated slight action, while normal numbers in 95 per cent. of the mosquitoes pointed to the ineffectiveness of the drug. Among the drugs tested were two varieties of paludrine [proguanil], atebrin [mepacrine] and four unnamed preparations. Paludrine A completely inhibited the development of the parasites into oöcysts in concentrations from 0·09 to 0·66 per cent., while at 0·04 per cent. its action was slight. Paludrine B was effective in a concentration of 0·18 per cent. but 0·09 per cent. proved to be insufficient. Atebrin was too toxic for the mosquitoes in a concentration of 0·66 per cent., but 0·18 and 0·09 per cent. solutions produced the desired effect. Preparations I and II inhibited oöcyst formation in concentrations of 1·81 and 1·66 per cent. respectively, whereas III and IV were practically inactive.

For tests on the effect of drugs upon fully developed oöcysts, the mosquitoes were first fed on an infected chicken, then kept for four days with access to pure honey water and two days without food, to allow the oöcysts to reach maturity. The mosquitoes were then fed on honey water containing the drug to be tested, and the results were determined by dissecting the mosquitoes at various intervals and examining the oöcysts on the stomach wall. Paludrine was found to have a marked inhibitory effect upon the oöcysts. If the drug was allowed to act for six days, their growth was visibly retarded ; after 10 days their contents were granulated and transparent, showing evidence of degeneration ; after 14 days the contents of the oöcysts became brown and opaque, while their walls were attenuated and easily ruptured, releasing the dead contents. This effect is illustrated by photomicrographs.

It is thus seen that paludrine affects not only the gametes and oökinetes in the lumen of the gut but also inhibits the development of the sporozoites in the oöcyst, which is ultimately killed. *C. A. Hoare*

Deschiens, R. & Pick, F. Action de certains antagonistes de l'acide pantothénique sur le paludisme aviaire à *Plasmodium gallinaceum*. [**Action of Antagonists of Pantothenic Acid on** *Plasmodium gallinaceum* **Infection in Chicks.**] *C. R. Soc. Biol.* 1949, May, v. 144, Nos. 9/10, 662–4, 1 chart.

It had previously been shown that the presence of pantothenic acid was necessary for the proper growth of *Plasmodium gallinaceum* in the blood of chicks and that in chicks deprived of this vitamin the progress of the malaria infection was much retarded. In the present experiment, the birds were deprived of the pantothenic acid by the administration of a drug antagonistic to it. The substance used was the sodium salt of para-aminosalicylic acid, and it was given intraperitoneally at the rate of 0·5 gm. (of acid) per kilo body weight per day. On the first day the birds also received blood infected with *P. gallinaceum*. The resultant parasitaemia was compared with that occurring in untreated birds. There was a striking difference in the two groups. In the treated birds, the incubation period was prolonged by two days, the parasite density was lowered, the duration of the disease was halved and there were no deaths. This effect was only seen in adult birds, the course of the disease being uninfluenced in four-day old chicks. *P. C. C. Garnham*

Ogaki, M. **Bird Malaria Parasites found in Malay Peninsula.** *Amer. J. Trop. Med.* 1949, July, v. 29, No. 4, 459–62.

One hundred and ninety-eight wild birds from near Kuala Lumpur were examined for the presence of malaria parasites. Three species of *Plasmodium*

were recovered, *P. relictum*, *P. circumflexum* and *P. lophurae*, the highest rate being 70 per cent. of the *Munia striata* infected with *P. circumflexum*. This parasite was also common in the domestic pigeon (*Columba livia*) (11 out of 13 were infected). Sub-inoculations of *P. circumflexum* were only slightly successful ; on the contrary *P. relictum* was easily passaged from bird to bird (*Munia maja*). *P. relictum* showed a cycle of 24 hours, with a peak of segmentation between 6 and 10 a.m., the merozoites numbering up to 18–24. This parasite has a special affinity for the young erythrocyte. Sub-inoculated birds died from a chronic infection after about a month, and the organs of such birds were " stuffed with parasites of all stages ".

[The interest of this paper lies more in the circumstances surrounding the investigation, than in the contents themselves. The paper is accompanied by a lengthy editorial footnote explaining how the work was done during the Japanese occupation of Malaya, and the authenticity of the observations. In a short reply, Professor Ogaki states that the results reported here were obtained by himself alone during seven months in 1945. It seems rather a case of " much ado about nothing ". The paper is not illustrated ; it seems not improbable to the reviewer that the parasite described under the name of *P. circumflexum* was in reality a *Haemoproteus* (*vide* the sub-inoculation results and its presence in the pigeon—a very common host of the latter parasite rather than of a *Plasmodium*), and the reference to the presence of the parasites in the organs without mention of the type of development, exoerythrocytic or otherwise, is obscure and without much value.]

P. C. C. Garnham

TRYPANOSOMIASIS

Jackson, C. H. N. **The Eclosion of Tsetse** (*Glossina*) **Larvae** (**Diptera**). *Proc. Roy. Entom. Soc. of London*. Ser. A. 1948, June 28, v. 23, Pts. 4/6, 36–8, 15 figs. on 8 pls.

Fifteen photomicrographs are given of sections cut through the uterus of *Glossina swynnertoni* ; the author's interpretations of these form the subject of this paper.

The mouth of the first instar larva is situated antero-dorsally and is blocked by a chitinized tooth. This tooth punctures the chorion which splits and is removed by an organ which the author names the choriothete. The choriothete deposits the chorion in a depression in the floor of the uterus where it appears to deposit also the cast skins of the moulting larva. The oral egg tooth of the first instar larva is cast with the larval skin, having up till then prevented the larva's attachment to the teat of the mother. It is not understood how the choriothete first seizes the chorion and then releases it. *H. S. Leeson*

Launoy, L. Recherches sur les trypanosomoses expérimentales. Index bibliographique, hypothèses de travail (1926–1949). [**Researches on Experimental Trypanosomiasis, 1926–1949.**] 131 pp. [Refs. in footnotes.] 1949. Lons-Le-Saunier : Imprimerie M. Declume.

In this volume Professor Launoy has recapitulated the results of his experimental work and theoretical reflections on trypanosomiasis in laboratory animals during the period 1926 to 1949. His numerous publications have been duly noticed in this *Bulletin* throughout that period.

The volume begins with an eight-page list of papers by the author and his assistants, grouped according to subject, as follows :—Trypanocidal action ;

chemoprophylaxis ; synergism ; chemo-resistance ; virulence ; course and types of experimental infection ; general reviews and students' theses. There follows a chapter outlining various basic hypotheses and findings which have guided the author's labours down the years. The next chapter deals with his observations on the prophylactic action of aromatic diamidines in experimental infections, and this includes several reprints of papers which have already appeared in the periodical literature.

There are then two general reviews of the history and problems of chemotherapy not only of trypanosomiasis but of infections in general. The first of these is reprinted from *Biologie Médicale*, 1936, v. 26, 190–219. The second is an entertaining discourse illustrated by portraits of leading personalities in the development of our knowledge of infectious diseases and chemotherapy.

The volume concludes with reprints of articles of a general instructional character, on various aspects of trypanosomiasis, addressed essentially to "*le grand public cultivé*" and to administrative officers in Africa.

The jaded reader of experimental minutiae in the first part of this volume may possibly be grateful to Professor Launoy for referring to his infected cats (p. 26) not by the customary serial numbers but by such appealing designations as Virginie, Dalila, Miette, Siegfried, Iago and Desdémone, Tristan and Iseult, etc. *E. M. Lourie*

CECCALDI, J., PELLISSIER, A. & ARNOULT, H. Résultats éloignés du traitement de la maladie du sommeil à la période lymphatico-sanguine par la pentamidine administrée par la voie intraveineuse. Première et deuxième note. [**Late Results of the Treatment of Sleeping Sickness in the Lymphatico-Blood Stage by Pentamidine administered Intravenously.**] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 5/6, 152–6 ; 250–56.

These contributions describe the results of intravenous pentamidine treatment in the lymphatico-blood stage of *T. gambiense* infection.

(i) The first paper deals with 21 patients who received ten daily injections of 2 mgm. per kgm. body weight, with an upper limit of 100 mgm. per injection. Earliest results have already been published [TRINQUIER and ARNOULT, this *Bulletin*, 1948, v. 45, 313], and the patients have now been followed up for periods ranging from ten months to three years, more than half of them for 2½ years. Frequent examinations, including lumbar punctures, were carried out during these follow-up periods. In no case did trypanosomes reappear in the blood, but four patients (19 per cent.) developed signs of involvement of the central nervous system four to 18 months after treatment.

(ii) The second paper deals with 22 patients who received five daily injections as follows : first dose 1·5 mgm. per kgm. ; second dose 1·75 mgm. ; third, fourth and fifth doses 2·0 mgm. per kgm. ; ceiling dose 100 mgm. These patients have been followed up for periods ranging from about 1½ to 2½ years. The result was a complete success in 16 cases, but the other six (*i.e.* 27 per cent. of the total) progressed to the stage of nervous involvement one to 15 months after treatment.

In discussion, M. J. SCHNEIDER pointed out that the intravenous route is now no longer used for pentamidine, and the usual intramuscular dosage is much higher than in the intravenous regimens described above. It is usual to give eight to ten injections of 3 to 4 mgm. per kgm. body weight, and experience in French West Africa has been that less than 8 per cent. of patients thus treated pass from the lymphatico-blood stage to the stage of nervous involvement. *E. M. Lourie*

ECCALDI, J. & ARNOULT, H. Emploi de la pentamidine par voie intraveineuse en trypanosomiase humaine dans les cas de rechutes sanguines. [**Intravenous Pentamidine in the Treatment of Blood Relapses of Human Trypanosomiasis.**] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 5/6, 160–64.

Among the *T. gambiense* patients treated with pentamidine by TRINQUIER nd ARNOULT [see this *Bulletin*, 1948, v. 45, 313] four were cases of blood lapse, with normal cerebrospinal fluid, after previous full-course treatment ith orsanine and tryparsamide. Three of these patients have been kept under bservation for one to three years since their treatment with pentamidine, and eir histories are now reported in detail.

One of the patients had been in the stage of " meningeal reaction " and one the stage of " meningo-encephalitis " when originally treated with orsanine nd tryparsamide. The blood relapses (cerebrospinal fluid being normal) ccurred nine months and four months later, and they were then treated with entamidine, ten intravenous injections of 2 mgm. per kgm. daily, after which ey both remained well during an observation period of three years.

The third patient had been in the lymphatico-blood stage when originally eated with orsanine. The blood relapse occured five months later. Since the rsanine treatment had been particularly thorough the authors consider this lapse, unlike the other two, to have been due to arseno-resistance on the art of the trypanosome. The patient remained well during an observation eriod of one year after the same course of pentamidine treatment as was dministered to the other two cases. *E. M. Lourie*

ORRIS, K. R. S. **Planning the Control of Sleeping Sickness.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1949, Sept., v. 43, No. 2, 165–98, 3 maps, 2 text figs. & 8 figs. on 2 pls. [15 refs.]

A most successful campaign against sleeping sickness in the Lawra District f the Northern Territories of the Gold Coast was described fully by the author 1946 [this *Bulletin*, 1947, v. 44, 51] and the present paper is largely a repetition f that one but carries the report up to 1947. Tsetse flies were almost completely iminated from the rivers, streams and pools where selective clearing of egetation was done, and the number of cases of sleeping sickness in a radius f at least 30 miles from the town of Lawra, as estimated by voluntary resort o Lawra hospital by the sick Africans, was reduced from 1,100 in 1938 to about 0 in 1947. The decisive method of selective clearing was begun in December, 940 and completed in 1945. Tsetse flies usually disappeared from the smaller reated localities within a month, while in continuous heavy fly-belt *Glossina palpalis* disappeared as quickly but *G. tachinoides* persisted in small numbers ntil the next dry season. A very important point emphasized by the author the ease of maintenance of the selective clearing—ten man-days of labour er square mile every three years, and in future probably every five years nly. Another important effect of the clearing was the replacement of the emoved vegetation by grass which checked erosion of the river banks by he current and supplied grazing for cattle, as well as hindering the regrowth f the bushes. An interesting result of the clearing was a limited invasion by *. morsitans* (*submorsitans*) from the Tumu District on the east and the French vory Coast (across the Black Volta river) on the west ; these invasions were ealt with by hunting the big game and settling people in the areas. The author mphasizes the need for careful planning of anti-tsetse campaigns, obviously ecognizing that combined consideration by specialists of various Departments ncluding the Treasury) and by the native farmers is required before undertaking arge-scale measures.

It would be interesting to know the effect, if any, on other biting flies though it is generally agreed that these are far less important than tsetse flies in the transmission of the more pathogenic trypanosomes. Both this and the previous paper are of great interest.] *J. F. Corson*

HORNBY, H. E. **I. Preliminary Report on Tsetse-Fly Conditions near Mutuáli** (pp. 5–20). **II. Notes on the Vegetation of the Coastal Districts of Portuguese East Africa between Lourenço Marques and Beira, in relation to the Distribution of the Tsetse Flies** (pp. 21–31). **III. Notes on the Vegetation near Tete in relation to the Distribution of Tsetse-Flies** (pp. 33–69) in *Colónia de Moçambique : Missão de Combate às Tripanossomíases : Elementos de Estudo sobre a Biologia das Glossinas de Moçambique.* 1948. Lourenço Marques : Imp. Nac. de Moçambique.

I. These papers, which are in English, consist of notes on the vegetation of certain parts of Portuguese East Africa and its relation to tsetse flies and trypanosomiasis of cattle. Most of the notes were made while travelling. The first paper describes the vegetation around Mutiali, which is situated about Long. 37°E. and Lat. 14° 50′S. amidst woodland infested by *Glossina morsitans*. There are no cattle and only a few goats, sheep, pigs and dogs ; game are present in sufficient numbers to furnish a dependable food supply to the fly. At present, settlements are scattered amid the luxuriance of high woodland and are not easily seen, but a new cotton research station will soon form a nucleus around which it is hoped that a large agricultural settlement will grow, and which must be protected. In discussing anti-tsetse measures the author puts forward two schemes, one of which involves the destruction of all game inside an area of about 900 square kilometres within a period of three years ; the other is intended to achieve the same result in a much smaller area and which will enable a small herd of cattle to be introduced in two years.

II. The second paper deals with the country along the coast road from Lourenço Marques to Beira. *G. morsitans* was encountered during this journey in a few places in the usual savannah type of landscape and in various places *G. pallidipes*, *G. austeni* and *G. brevipalpis* were suspected though not seen.

III. The third paper concerns the Tete area and five roads that radiate from it. The vegetation along these roads is recorded ; south to Cochemane on the way to Salisbury, Southern Rhodesia ; south-east to Beira on the coast; north-east to Zobue ; north-west along the Zambezi valley to Chicoa and north to Furancungo. From the survey around Tete it appears that the town is in a shrinking fly-free area surrounded by fly-infested country. The aim of the Mission to Combat Trypanosomiasis is to stop the fly's advance, to enable cattle to be kept in safety and to enlarge the safe area. The present absence of fly in this region is attributed not only to the great heat of the Zambezi valley but perhaps more to the presence of the kind of close deciduous bushland which is known to be unsuited to *G. morsitans*, and also to *G. pallidipes*, which is the only other species of tsetse known to occur anywhere nearby.

H. S. Leeson

LAUNOY, L. Précisions sur la virulence actuelle de *T. gambiense* (souche Yaoundé) pour le rat. [**Present Virulence for the Rat of Yaoundé Strain of** *T. gambiense*.] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 5/6, 243–7.

This paper deals with a change in virulence for rats in the neurotropic strain of *T. gambiense* previously described by ROUBAUD *et al.* [this *Bulletin*, 1946, v. 43, 419], who found that the duration of the infection varied from 45 to 132 days. The author, who has maintained this strain by intraperitoneal

passages through rats, records a regular increase in its virulence since 1947. Thus, between May and September 1947, the mean duration of the infection was 69 days ; between December 1947 and April 1948 it was 54 days, falling to 47 days in January 1949. While the exaltation of virulence might have been caused partly by rapid passages, the author believes that it is mainly due to five passages made through very young rats in 1948. In subsequent passages through adult rats the trypanosomes invaded the blood stream during the first three days after inoculation. Shortly afterwards they were undetectable in the blood, having undergone trypanolysis, but their continued presence could be ascertained by successful inoculation of mice with small amounts of blood from the rats. In one rat signs of paraplegia appeared 36 days after inoculation. It was also shown that massive doses of trypanosomes ($\frac{1}{2}$ to 2 million) inoculated into mice were also followed by rapid invasion of the blood, resulting in parasitaemia, and in some cases in death of the animals within the next seven days. *C. A. Hoare*

Launoy, L. Nouveaux documents sur la prophylaxie chimique, obtenue par voie orale, chez le rat, contre l'infection à *Trypanosoma gambiense* (souche Yaoundé). [**Further Communication on Chemoprophylaxis by the Oral Route against the Yaoundé Strain of** *T. gambiense* **in the Rat.**] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 5/6, 240–43.

The author's earlier communications on chemoprophylaxis against the Yaoundé strain of *T. gambiense* were reviewed in this *Bulletin*, 1948, v. 45, 1071 ; *ibid.*, 1949, v. 46, 337. In the present work he has used the penicillic acid salt of lomidine base [identical with pentamidine base]. This salt is very insoluble in water. It was therefore dissolved in ethyl alcohol. The addition of water to such a solution causes the drug to be precipitated in sufficiently fine particles for accurate oral administration to be a simple matter if carried out quickly enough.

Each of 12 rats was given a single oral dose, ranging in size from 35 to 75 mgm. per 100 gm. body weight. The rats were then inoculated with trypanosomes intraperitoneally at a later date. In the nine animals whose inoculations were carried out 11 to 27 days after treatment no infection resulted in an observation period of 390 days. In the three (each treated by 50 mgm. per 100 gm. body weight) inoculated 27 to 33 days after treatment the drug failed to protect, and infections duly developed.

There were 19 control rats, not treated by the drug but inoculated with trypanosomes at the same time as the previously treated animals. They all died of the infection in an average of 46 days since inoculation.

E. M. Lourie

Piekarski, G. Blepharoplast und Trypaflavinwirkung bei *Trypanosoma brucei*. [**Action of Trypaflavine on the Blepharoplast of** *Trypanosoma brucei*.] *Zent. f. Bakt.* I. Abt. Orig. 1949, Feb. 21, v. 153, Nos. 3/5, 109–15. [24 refs.]

The author refers briefly to some of the earlier work on drug-fastness and the loss of the blepharoplast by trypanosomes after exposure to certain drugs, and describes an experiment made by him in 1947 at Bonn University. He treated a strain of *Trypanosoma brucei* in mice by injections of trypaflavine and observed that the trypanosomes had all lost the blepharoplast after four weeks and had become resistant to the maximum tolerated dose (0·5 mgm. per 20 gm. mouse) after 11 weeks. When tested again after eight months for drug-fastness the trypanosomes had again become almost fully sensitive to

trypaflavine, but showed no blepharoplast and this was still absent after 15 months. To determine the presence of the blepharoplast the author prefers the following method of staining to that of Feulgen : fix with methyl alcohol; treat with N/1 HCl for ten minutes ; neutralize and stain with dilute Giemsa's stain (1–20) for 20 minutes. [The loss or absence of the kinetoplast (blepharoplast) in relation to heritable variation in trypanosomes has been fully discussed by HOARE, see this *Bulletin*, 1941, v. 38, 314.] *J. F. Corson*

SAUTET, J. & RANQUE, J. Action d'un principe bactériostatique de l'eucalyptus sur *Trypanosoma brucei*. [**Action of a Bacteriostatic Principle of Eucalyptus on** *Trypanosoma brucei*.] *Méd. Trop.* Marseilles. 1949, May–June, v. 9, No. 3, 400–402.

LARANJA, F. S., DIAS, E. & NOBREGA, G. Clínica e terapêutica da doença de Chagas. [**Chagas's Disease : its Symptoms and Treatment.**] *Mem. Inst. Oswaldo Cruz*. 1948, June, v. 46, No. 2, 473–529, 31 figs. [72 refs.] English summary.

This account of the symptoms and treatment of Chagas's disease is based on 103 acute and 505 chronic cases in Bambui, Minas Gerais, seen during the five years 1943–48. Fourteen of the acute and 39 of the chronic patients died and 26 came to autopsy. Division is made on the usual lines : two forms of the acute type, namely, those apparently benign at the beginning but becoming chronic and those with nervous manifestations ; and five forms of the chronic, namely, pseudo-myxoedematous, myxoedematous, cardiac, nervous, and those showing acute exacerbations from time to time. As with nearly all papers on this disease the circulatory changes form the main subject of the present contribution. There are several reproductions of the X-ray pictures of the thorax and 179 electrocardiographic recordings, together with photographs of a child showing Romaña's sign and another with a primary, inoculation chagoma, temperature charts and photomicrographs of the myocardial tissues. It is, of course, not possible to analyse all these data in an abstract and only certain main points can be referred to here.

Acute cardiac disease in American trypanosomiasis is evidenced by gallop rhythm, enlargement of the heart's shadow, due at times to dilatation, sometimes to pericardial effusion, prolongation of the P-R interval, primary T wave changes, ventricular extrasystoles and, occasionally, right bundle branch block. Convulsions usually occur before death, but many patients with the acute cardiac conditions seem to recover who, nevertheless, later show the signs of chronic disease. Those in this symptomless intermediate stage are, therefore, regarded as " potential heart patients " and they are classed as instances of the chronic indeterminate form of the disease. In general, about half of the cases of chronic Chagas's disease have signs of cardiac involvement—palpitation, dyspnoea, syncopal attacks from A-V block, and praecordial pain. Irregular and, at times, gallop rhythm are heard, and dilatation of all cavities may be present, but more commonly of the right ventricle ; blood-pressure is usually about normal until signs of heart failure arise. Diagnosis has to be made from syphilitic cardiac conditions, from the results of arteriosclerosis, from coronary disease and rheumatic carditis. The prognosis is not good ; life rarely extends beyond 50 years, though much depends on the type of arrhythmia and the degree of cardiac enlargement.

Many drugs have been tried. Special mention may be made of 7602(Ac) Bayer, 9736(As), antimonials and penicillin. 7602(Ac) Bayer, used as intramuscular injections in a 3 per cent. solution in water, daily or on alternate days, in doses of 100 mgm. per kilo for children and 30–60 mgm. per kilo for

adults, was more effectual than 9736(As) Bayer which is an arseno-benzol sulphate. Penicillin injected intramuscularly in doses of 500,000 units every three hours over a period of ten days has given conflicting results ; sometimes the effect is brilliant, at others it was totally ineffectual. For those with oedema diuretics such as theobromine, diuretine ; for the anaemia some preparation of iron or a liver extract with vitamin C. When the heart begins to fail the greatest benefit has been obtained from strophanthine or digitalis. The article is well documented. *H. Harold Scott*

Pellegrino, J. & Borrotchin, M. Inquérito sôbre a doença de Chagas no Hospital da Santa Casa de Misericórdia de Belo Horizonte (Minas Gerais, Brasil). [**Chagas's Disease as seen at a Hospital in Minas Gerais, Brazil.**] *Mem. Inst. Oswaldo Cruz.* 1948, June, v. 46, No. 2, 419–57, 16 figs. & 2 maps. [53 refs.] English summary.

This is a comprehensive article and covers more than would be expected from the title in that it deals more or less completely with Chagas's disease in the State of Minas Gerais and not merely with cases seen at the Hospital de Santa Casa de Misericordia in Belo Horizonte.

There are 15 species of Triatomidae, belonging to four genera, which can transmit the infection in Minas Gerais : *Panstrongylus geniculatus*, *P. megistus* and *P. diasi* ; *Psammolestes coreodes* ; *Rhodnius prolixus* and *R. domesticus* ; *Triatoma rubrofasciata*, *T. infestans*, *T. maculata*, *T. sordida*, *T. vitticeps*, *T. brasiliensis*, *T. b. melanica*, *T. chagasi* and *T. arthurneivai*, but only the 2nd, 8th, 10th, 11th, 13th and 14th are met with naturally infected and three only are of true epidemiological importance, namely, *P. megistus*, *T. infestans* and *T. sordida*, which infest the houses. A line map shows the geographical distribution of these in the State and in a table are shown the percentages positive of those captured in 13 zones of Minas Gerais. Briefly, in 204 of the 316 municipalities these insects were found and in 143 were the *Triatomidae* infected with *T. cruzi*. Another line map shows the main foci of the disease in the State.

The present study was of 181 patients in the hospital and it included a general clinical examination, electrocardiograms, radiograms and xenodiagnostic tests on those giving a positive Guerreiro-Machado reaction. This reaction and procedure are described and the patients divided into two main groups according as they were negative (145 of the 181) or positive (36) to the test, and in each group the cardiac conditions and electrocardiograms, the Wassermann reaction, xenodiagnostic tests and closeness of contact with *Triatomidae* were investigated. Several radiograms of the thorax are reproduced and nearly 100 electrocardiographic tracings, together with photomicrographs of the histological changes in the myocardium. The following, from the authors' conclusions, sums up the general findings :—

" 37 out of the 181 (20·44%) patients examined had positive laboratory tests for Chagas' disease. 49 (27·07%) had heart troubles with the following etiology : Chagas' disease (18 cases) ; arteriosclerosis (13 cases) ; hypertension (12 cases) ; sýphilis (6 cases) ; rheumatic fever (3 cases) ; congenital heart disease (1 case) ; chronic cor pulmonale (1 case). [These total 54.]

" 18 out of 34 Chagas' disease patients (52·95%) showed evidences of myocardial damage. The most frequent electrocardiographic changes were right bundle branch block, ventricular premature beats, alterations of QRS (single or associated to alterations of T wave), auriculo-ventricular blocks. . . .

" 50·0 per cent. of the patients with chronic Chagas' heart disease were under 30 years of age and 80·33 per cent. of the patients with heart lesion from other causes than Chagas' disease were over 30 years.

"The complement-fixation test (*Schizotrypanum cruzi* culture antigen) owing to its specificity and sensibility proved to be very useful for the laboratory diagnosis of chronic Chagas' disease.

"Xenodiagnosis was positive in 8 out of 31 (25·8%) patients with positive complement-fixation tests.

"The question of the etiology of megaoesophagus and megacolon has been discussed and the writers admit that schizotrypanosis may possibly be of significance in the development of these conditions. . . .

"The writers . . . express the belief that it [Chagas' disease] is one of the most important factors of heart disease in the rural zones of the State of Minas Geraes."

H. Harold Scott

LEISHMANIASIS

DE AZEVEDO, J. F. Sur la transmission du kala-azar méditerranéen. [**The Transmission of Mediterranean Kala Azar.**] *An. Inst. Med. Trop.* Lisbon. 1948, Dec., v. 5, 269–87, 3 figs. [35 refs.]

Only those theories of transmission which have been brought forward since the causal agent of kala azar was discovered are here considered.

The occurrence of the parasite in the peripheral blood pointed to the intervention of an arthropod as the vector, and thus fleas, bugs, ticks, house flies, stable flies, mosquitoes and *Phlebotomus* have, in turn, come under suspicion.

Experimental and epidemiological studies have ruled out all these except *Phlebotomus* flies. The mention of the flagellates found by MACKIE in *Phlebotomus* flies is irrelevant as these were shown afterwards to be trypanosomes. In spite of the general acceptance of the *Phlebotomus* as vector, based on experimental work, nearly all those who have made epidemiological studies on the subject have come across factors difficult to explain on the assumption that transmission by *Phlebotomus* is the only method of disseminating the disease.

Until recently kala azar in Portugal has remained a rare disease and limited to a fixed area, but since 1941 there appears to have been an appreciable increase in the number of cases, although this may have been due to the greater facilities for recognition provided by the establishment of anti-malarial centres.

In the large towns, however, where means of diagnosis have always been available the number of cases has really increased in recent years as shown in hospital returns and we may now say that kala azar is found from North to South Portugal. There is evidence, also, of an increase in the proportion of adult cases, so comparatively uncommon in the Mediterranean form of the disease. Accompanying the increased prevalence in human beings is a similar increased percentage of infections in dogs.

In considering the rôle of *Phlebotomus* in transmission there are points both for and against it as compared with the possibility of transmission by contact, direct or indirect. Four species of *Phlebotomus* have been identified in Portugal, *P. perniciosus*, *P. minutus*, *P. sergenti* and *P. ariasi*. The dominant species (90 per cent.) is *P. perniciosus*.

The distribution of *Phlebotomus* has not been surveyed for the whole country but they have been found wherever search was made for them. Only *P. perniciosus* has been found outside Lisbon but the other species may nevertheless exist there. It has also been found in one town, Covilhã, at an altitude of 600–650 metres. It may be presumed, therefore, that *P. perniciosus* plays the most important rôle in the transmission of kala azar.

A study of the feeding habits of *Phlebotomus* by means of precipitin tests and by examining the places of capture showed a preference for various types of blood in the following descending order—cattle, dogs, birds, horses and man. Of 178 positive blood reactions, 176 came from *P. perniciosus* but the number of each species examined is not stated. Out of 2,064 females dissected only one was infected with a leptomonas.

In an examination of 157 dogs, nine were found infected with *Leishmania*.

From the above data, which would appear somewhat inadequate, and from the estimated number of cases of kala azar, there have been calculated the probabilities of the rôle played by these insects in producing infections in man and dogs. The equations in this respect are set forth and the results are discussed.

Certain statements are then made which cannot be accepted in full as evidence to support the author's conclusions. For instance, it is considered of great importance that although the flies feed by preference on cattle yet the examination of spleen smears from 200 animals revealed no *Leishmania*. As the infection rate in flies was 1 in 2,064, as cattle are probably highly refractory to infection, and as there is no evidence that any of the flies was infected the finding is perhaps not unexpected.

Then, again, as evidence of the possibility of methods of infection other than by the bites of *Phlebotomus*, mention is made of the many ways in which infection has been brought about experimentally, including infection of animals by the administration of *Leishmania* by the mouth. This is contrasted with the uniformity of transmission of the plasmodia and trypanosomes by blood-sucking arthropods. [The fallacy of this argument is exposed by the fact that malaria of both birds and monkeys as well as infections of some trypanosomes, can be produced by the giving of infective material by the mouth in exactly the same way as in the case of *Leishmania*, but no one would suggest that this ever occurs in nature in the case of the plasmodia.] The author finally comes to the conclusion that the evidence he has brought forward shows that transmission of kala azar by *Phlebotomus* does not completely explain all the epidemiological facts and that new investigations are called for to examine possible methods of transmission.

[The author's arguments are moderately stated and in no sense special pleading to support a predetermined hypothesis, but certain fallacies have already been mentioned and one more may be stated. The very low infection rate found in *Phlebotomus*, 1 in 2,064, is to be expected if random collecting is done. Owing to their habits, the flies never go far from their food and it would only be in flies collected near to cases of kala azar that a somewhat higher infection rate would be expected.] *H. E. Shortt*

Barrientos, L. P. Um caso atípico de leishmaniose cutâneo-mucosa (Espundia). [**An Atypical Case of Espundia.**] *Mem. Inst. Oswaldo Cruz.* 1948, June, v. 46, No. 2, 415–18, 6 pls.

The patient whose condition is graphically shown in a series of very clear photographs was at one time regarded as suffering from leprosy and indeed the illustrations would do excellently as examples of nodular leprosy of the face. Six years previously the patient, a man of 42 years, injured his left leg [the nature of the injury is not mentioned] and an ulcer formed which healed rapidly without any treatment. "Some time later" a papule formed at the site of the scar which caused itching and became hardened, then ulcerated and was covered by a crust. Next, several fresh papules and nodules developed on the leg and thigh, and two years ago there appeared on the face and arms many, "about seventy", nodules which were painless but bled readily;

some were verrucose, others keloid, ranging in size from that of a pea to that of a walnut, tending to ulceration and scabbing. At the same time painful, readily bleeding ulcers and fungoid growths appeared in the nose and nodules were seen on the ears and a small ulcer on the hard palate. Leprosy bacilli were expected and looked for in vain, but leishmania in large numbers were seen, of unusual shapes, fusiform as well as round and ovoid, single and free or in mononuclear cells containing perhaps as many as 50 elements. The Wassermann reaction was negative. Iodides and arsenic were given without effect; then tartar emetic which brought about a little improvement but caused signs of intolerance, nausea and much coughing, and the use of this drug had to be suspended. In 1947, Repodral was tried with Yatren 105 intravenously, but the disease continued to advance even though the patient had received 480 cc. of Repodral. Penicillin was next tried; 1,800,000 units were given and the reaction was marked but the lesions continued to progress. Chloromycetin *per os* proved disappointing, and in January, 1948, the patient was admitted to hospital and was given tartar emetic, metaquine [mepacrine] and anti-gangrene serum. After 16 days he left with the lesions slightly better. Soon, however, he suffered from severe attacks of fever followed by marked improvement of the lesions. The treatment was continued and a photograph shows the change from the original state to the time of writing up the case, February, 1948. *H. Harold Scott*

FEVERS OF THE TYPHUS GROUP

CALERO, C. Tifo murino (endemico) en el Istmo de Panama. I. Estudio clinico epidemiologico. II. Confirmación experimental. [**Murine (Endemic) Typhus in the Isthmus of Panama. I. Clinical and Epidemiological Study. II. Experimental Confirmation.**] *Archivos Hospital Santo Tomas.* 1948, Apr.–June & July–Dec., v. 3, Nos. 2 & 3/4, 97–108; 165–9, 1 graph. English summaries.

I. This and the following paper are of special interest because of the results of the laboratory tests carried out in a study of six cases of murine typhus investigated by the author during the first ten months of 1947.

Sera of four of the patients were examined at the Army Medical Centre, Washington. In three cases the complement-fixation tests were negative against both murine and epidemic antigens, in one case there was a positive reaction against murine antigen at a titre of 1–80, and a negative reaction against epidemic antigen.

In agglutination tests the titres with epidemic rickettsiae ranged from 1–160 to 1–2,560, and with murine rickettsiae from 1–1,280, to 1–10,240. The titres in individual cases were four to sixteen times higher with murine than with epidemic rickettsiae.

II. The six cases of murine typhus referred to in the preceding paper were studied by guineapig inoculation. Each guineapig received 3·0 cc. of fresh blood by the intraperitoneal route. The febrile reactions were of the usual types, but only one animal gave a pronounced scrotal reaction; another gave a moderate reaction, and the rest were negative.

Sera of four of the guineapigs were examined at the Typhus Institute of Mexico; all gave positive reactions with the complement-fixation test; the titres ranged from 1–40 to 1–80 with murine antigen, and all were negative with epidemic and Rocky Mountain spotted fever antigens. All the sera agglutinated murine rickettsiae at titres of 1–40 to 1–320, and all failed to agglutinate epidemic rickettsiae. *John W. D. Megaw*

BLUMBERG, N., DOANE, J. C. & WEISS, L. B. **Brill's Disease. Report of 3 Cases with Aureomycin Treatment in 2.** *New England J. of Med.* 1949, Sept. 29, v. 241, No. 13, 479–83. [17 refs.]

AUDY, J. R. **A Summary Topographical Account of Scrub Typhus 1908–1946. Studies in the Distribution and Topography of Scrub Typhus, Number 1.** *Bull. Inst. Med. Res. Federation of Malaya.* 1949, No. 1, pp. v+84, 2 charts & 26 figs. (1 folding map). [59 refs.]

The primary purpose of this Bulletin is stated as being to review the ecological features of the foci of scrub typhus that have been described up to the end of 1946. A considerable part of the paper consists of extracts from a report already published by the author in Part III of a British War Office publication, *Scrub Typhus Investigations in South-East Asia* [see this *Bulletin*, 1948, v. 45, 62–70]. The paper also contains a record " as complete as possible " of infected sites in the countries in which the disease is endemic. The bibliography contains references to more than 60 papers, and the 26 illustrations, which include 12 photographs taken from the air, add greatly to the interest and value of the paper.

Medical men in the affected countries will find the report very useful as a guide to the recognition of areas likely to be infected.

Rat-infested damp areas overgrown with grass appear to be the chief foci of infection, but even in such areas infection is often confined to small " islands ".

The general impression conveyed by the paper is that scrub typhus is more closely associated with damp grass than with scrub. Repeated references are made to the presence of tall *Lalang* and other grasses in the infected areas. In countries where dry and wet seasons alternate the number of attacks and the density of the population of larval *Trombicula deliensis* have been found to be greatest during and after the rainy season.

In the heart of dense forests there is very little risk of infection ; forest clearings, forest fringes, and, most of all, abandoned village sites provide conditions specially favourable to the vector mites and their hosts, of which the rat is the most important.

The author is engaged on a detailed topographical survey of endemic foci in Malaya ; a description of this and of the lessons to be learned from the information gained will be the subjects of two further papers which are sure to be of great value to students of scrub typhus and to the medical profession of affected countries. *John W. D. Megaw*

FOX, J. P. **The Neutralization Technique in Tsutsugamushi Disease (Scrub Typhus) and the Antigenic Differentiation of Rickettsial Strains.** *J. Immunology.* 1949, July, v. 62, No. 3, 341–52, 1 fig. [20 refs.]

Several recent papers have contained evidence showing that striking antigenic differences occur among the various strains of *Rickettsia orientalis*.

In the present paper the author describes a large series of experiments in which he has tested the degree of neutralization of eight strains of *R. orientalis* by each of eight antisera prepared from these strains. He shows that the strains fall into four, possibly five, groups, which are as follows : (1) Two Indian strains, the Calcutta and the Imphal ; (2) Two Malayan strains, the Serangayee and the Raub, and a Queensland strain ; (3) The Karp, New-Guinea, strain ; (4) The Gilliam, Assam-Burma border, strain, and (5) possibly the Pescadores strain.

The detailed description of the experiments includes some interesting observations on the mechanism of the neutralization which appears to depend

largely on the union of antigen and antibody *in vitro*, though the occurrence of a zone phenomenon suggests that passive immunity may play a part. This phenomenon consisted in the occurrence of a larger survival rate among mice that had received large doses of infected yolk sac mixed with a unit quantity of antiserum as compared with a smaller survival rate among the mice that had received smaller infecting doses mixed with the same amount of antiserum. The explanation suggested is that the antiserum may confer a passive immunity lasting long enough to protect the heavily infected mice till active immunity becomes established, but not long enough to tide over the longer period needed for the production of active immunity in the mice that receive smaller doses of infection.

Neutralization was also found to be independent of complement.

Attempts were made to study the immune sera by complement-fixation tests, but it was found impossible to prepare fully satisfactory antigens by the methods described by BENGTSON and others, and although the Gilliam and the Imphal-Calcutta strains could be differentiated rather sharply, the Karp, Serangayee, and Queensland antigens reacted rather indiscriminantly with antisera against all of the strains.

The author points out that further study of strains from various regions is urgently needed, both for its epidemiological interest and from the standpoint of developing vaccines of proper antigenic composition.

The paper is an important contribution to the study of the mite-borne typhus fevers, which, although forming a rather homogeneous group in other respects, would appear to include several types quite distinct from each other from the point of view of their immunizing properties.

The situation is still further complicated by a circumstance mentioned by the author that BENNETT and others have found strains belonging to two distinct antigenic types in the relatively small Dobradura region of New Guinea (see *J. Bacteriology*, 1947, v. 54, 93). *John W. D. Megaw*

ROONWAL, M. L. **Systematics, Ecology and Bionomics of Mammals studied in connection with Tsutsugamushi Disease (Scrub Typhus) in the Assam-Burma War Theatre during 1945.** *Trans. Nat. Inst. Sci. India.* 1949, Jan., v. 3, No. 2, 67–122, 5 figs. & 6 pls. (2 maps). [78 refs.]

The author was for six months mammalogist to the G.H.Q. (India) Field Typhus Research Team in Imphal on the Assam-Burma border, and this paper appears to be the zoological report which should have formed Appendix 20 of a War Office report which included a preliminary account of the work of that team [this *Bulletin*, 1948, v. 45, 62].

The bulk of the paper is a list of the twenty-three species seen, with synonymy, known distribution and ecological notes for each. Only the four following species were sufficiently numerous for more than a dozen specimens to be collected. The name *Rattus rattus bullocki* Roonwal 1948 has been proposed by the author for the commonest species, a white-bellied rat variously referred to in other reports as *R. r. rufescens*, *R. nitidus nitidus* and, in the War Office report, as *R. rattus* near *brunneusculus* : 359 specimens of *R. r. bullocki* were collected. It was a partly arboreal general feeder, occurring everywhere but found more abundantly in evergreen jungle and riverine associations than in oak scrub. *R. manipulus manipulus* (Thomas)—a general feeder with a liking for earthworms—was less common (21 specimens) and was perhaps most abundant in oak scrub. *Suncus caeruleus fulvocinereus* and *S. griffithi* were the two common shrews (26 and 15 specimens). Both were insect feeders and preferred moist places.

About 160 of the 500 mammal specimens obtained were examined for mites, and the sites of attachment are given in detail. Unfortunately the species or even families of the mites are not indicated.

Notes are given on the fauna of different plant communities, and the numbers of rats trapped in different habitats are compared by reducing them to a standard rate. The four rats trapped in riverine jungle, for instance, are reduced to a rate of 264 rats per 100,000 sq. feet per 100 traps.

In the Introduction, reptiles are given prominence as " reservoirs of infection " of scrub typhus although the vectors have never been recorded from reptiles : SOUTHCOTT's observations [this *Bulletin*, 1948, v. 45, 251] on infested lizards in Queensland are in guarded terms and are not confirmed by the identification of the mites. The distribution map of scrub typhus (Fig. 1) is so incomplete as to be misleading. Many outbreak centres are omitted whilst others are exaggerated ; for example, the Maldives are shown as the source of " unconfirmed or doubtful cases ", though the outbreak on Addu Atoll was actually investigated by the G.H.Q. (India) Field Typhus Research Team in 1944–45.

J. L. Harrison

WONG, S. C. & COX, H. R. **Action of Aureomycin against Experimental Rickettsial and Viral Infections.** *Ann. New York Acad. Sci.* 1948, Nov. 30, v. 51, Art. 2, 290–305, 4 figs. [41 refs.]

The authors describe the original experiments in connexion with aureomycin, a recently discovered antibiotic to which several references have been made in this *Bulletin* [see, for example, 1949, v. 46, 350].

By tests carried out on infected embryonated eggs, mice, and guineapigs, the drug was shown to have marked therapeutic activity against the viruses of the psittacosis-lymphogranuloma group, and against rickettsiae of the " spotted fever ", scrub typhus, and Q fever groups.

The drug was found useless against the B strain of influenza virus, canine distemper, rabies, Newcastle disease, equine encephalomyelitis, and the MEF-1 strain of poliomyelitis.

John W. D. Megaw

ANIGSTEIN, L., WHITNEY, Dorothy M. & BENINSON, J. **Aureomycin—a New Antibiotic with Antirickettsial Properties : its Effect on Experimental Spotted Fever and Epidemic Typhus.** *Ann. New York Acad. Sci.* 1948, Nov. 30, v. 51, Art. 2, 306–17, 7 figs.

See this *Bulletin*, 1949, v. 46, 725.

STRAUSS, E. & SULKIN, S. E. **Q Fever. A Note clarifying the Identity of American Strains of** *Coxiella burnetii*. *Amer. J. Pub. Health.* 1949, Aug., v. 39, No. 8, 1041. [10 refs.]

The authors refer to personal communications received from Dr. Herald R. Cox and J. E. Smadel in which it is pointed out that it has been conclusively established that the American Dyer and Nine-mile strains of *Coxiella* [*Rickettsia*] *burneti* are not similar in respect of their serological sensitivity and specificity, and that the Nine-mile American and the Henzerling Italian strains are much more sensitive than the Dyer American strain ; also that there is no essential difference between the Nine-mile and Henzerling strains in these respects.

Accordingly the authors withdraw as invalid the implications contained in their recent paper [see this *Bulletin*, 1949, v. 46, 726] to the effect that a greater number of sera would have fixed complement if the Henzerling strain had been employed. In fact they used the sensitive Nine-mile strain in their experiments.

John W. D. Megaw

Lennette, E. H., Meiklejohn, G. & Thelen, H. M. **Treatment of Q Fever in Man with Aureomycin.** *Ann. New York Acad. Sci.* 1948, Nov. 30, v. 51, Art. 2, 331–42, 7 figs.

A controlled experiment could not be carried out, but the drug aureomycin was given to patients who were regarded as likely to have long and stormy attacks.

The intramuscular route was tried in four cases but was found unsatisfactory. Ten patients were given oral treatment ; they received 3·2 to 4·0 gm. during the first 24 hours, and daily amounts of 1·6 to 2·0 gm. for four or more days.

In eight cases the temperature fell to 99°F. or less within two or three days ; in the other two cases normal was reached after four or five days.

Convalescence was uneventful except in two cases in which only 10 gm. had been given during a period of four days and in which there was a return of the fever two days after the last dose had been given. Both of the patients responded promptly to a further course of treatment.

Five other patients were treated for attacks which had already lasted for 23 to 77 days ; the results were good except in the case of a man aged 51 years who failed to respond to very large doses.

There was nausea and occasional vomiting in four cases, but these symptoms had already been present and so could not be definitely attributed to the drug. Two patients had pruritus and soreness of the scrotum and one of these had soreness of the mouth, but there was no aggravation of the symptoms after further doses of the drug. No other toxic effects were observed.

John W. D. Megaw

YELLOW FEVER

Laemmert, H. W., Hughes, T. P. & Causey, O. R. **The Invasion of Small Forests by Yellow Fever Virus as indicated by Immunity in Cebus Monkeys.** *Amer. J. Trop. Med.* 1949, July, v. 29, No. 4, 555–65, 3 figs.

In June 1935, an epidemic wave of yellow fever infection in man entered the western part of the State of Minas Gerais in Brazil from the adjoining State of Goias, and progressed slowly southward intermittently in the rainy warm seasons until 1940. Cases occurred in the vicinity of the town of Passos in western Minas Gerais for three successive years, instead of during the expected single wet season only.

Ten years later a similar wave of yellow fever passed southward through the same States, but apparently stopped short of Passos.

The cebus monkeys in the region about Passos were investigated after May 1945, to determine how long virus had persisted in the locality after 1938, and to determine whether or not a wave of infection in monkeys had preceded and extended beyond the area of known human infections in 1945.

Sera were examined from 1,153 cebus monkeys trapped in 212 wooded areas in the region which was 3,600 square kilometres (approx.) in area. The sera of 37 monkeys gave unsatisfactory results on repeated testing. Of the remaining 1,166 sera, 120 (10·75 per cent.) contained a significant amount of neutralizing antibody for yellow fever virus. The adult and old adult group comprised 60·4 per cent. of all studied. All but two of the immune monkeys were definitely adults. There was some doubt as to the exact age of two young females. For some unexplained reason a higher percentage of females than males were positive.

Many of the monkeys were caught several times and bled for periods up to three years. None developed immunity during the period of observation.

As a comparison, cebus monkeys were trapped in an area where human infection occurred in 1944–45. The sera of 79 monkeys were tested and 68 (86·1 per cent.) contained immune bodies for yellow fever virus. The immunity in this group was distributed evenly among the several age groups.

Cebus monkeys have been shown to have a very limited home range, and yellow fever is rarely fatal among them. The evidence available suggests that the virus is spread by infected mosquitoes throughout the isolated and discontinuous forest patches in the type of country in which Passos lies.

F. O. MacCallum

WADDELL, Mary B. **Comparative Efficacy of certain South American *Aëdes* and *Haemagogus* Mosquitoes as Laboratory Vectors of Yellow Fever.** *Amer. J. Trop. Med.* 1949, July, v. 29, No. 4, 567–75. [18 refs.]

Yellow fever virus has been detected in South America in naturally infected mosquitoes of the following species: *Haemagogus spegazzinii, H. spegazzinii falco, H. capricorni, Aëdes leucocelaenus*, and a group of sabethines. The first three species have also been shown to transmit the virus in the laboratory.

The present paper records successful transmission experiments with *A. leucocelaenus* carried out in the laboratory by Whitman, Tulloch and Waddell, in 1940. Thirteen mosquitoes were used in six attempts. Only two experiments were successful. The first transmission was effected by a single mosquito which failed to infect a normal rhesus after undergoing an incubation of 15 days from its infected meal, but produced a fatal infection in the monkey when it re-fed on the 22nd day. The second transmission occurred in a monkey bitten by six mosquitoes which had fed 20 days previously on infectious material which had a titre of $10^{5\cdot4}$/LD50.

Several species of mosquitoes were compared with *Aëdes aegypti* for their efficacy as transmitters of the virus by bite in laboratory animals. *Aëdes leucocelaenus* was slightly more effective than *Aëdes aegypti*, but *Haemagogus capricorni, H. spegazzinii, H. equinus, Aëdes scapularis* and *H. splendens*, were all less effective, in that order.

F. O. MacCallum

DENGUE AND ALLIED FEVERS

REUL, R. & EERAERTS, W. Une épidémie de "dengue-like fever", dans la province de l'Équateur, au Congo Belge. [**An Epidemic of a Dengue-like Fever in the Equator Province, Belgian Congo.**] *Ann. Soc. Belge de Méd. Trop.* 1949, June 30, v. 29, No. 2, 151–75, 3 graphs. [18 refs.]

The authors describe a careful study of two small epidemics of a fever which they cautiously call "dengue-like", though the diagnosis of dengue seems to have been established on evidence as complete as is usually available in outbreaks of that elusive disease.

Both the symptomatological and the epidemiological features of the outbreaks are shown to be consistent with the diagnosis of dengue; *Aëdes aegypti* mosquitoes were found in both of the affected areas, though in relatively small numbers; only one was found among 264 mosquitoes caught in an area in which 20 persons, out of a total European population of 84, were attacked during the previous month.

By standard laboratory tests the authors excluded fevers of the typhus and typhoid groups, brucellosis, and infectious mononucleosis. Blood cultures gave no evidence of bacterial infection, and apart from Rift Valley fever it was possible to exclude every known type of infection that could have caused similar manifestations.

The only significant result obtained by animal inoculation was observed in a monkey, *Cercocebus aterrimus*, which after intraperitoneal inoculation with blood of a patient, gave a febrile reaction and showed blood changes similar to those described by Blanc and Caminopetros [this *Bulletin*, 1930, v. 27, 146] as occurring in monkeys inoculated with the virus of dengue.

John W. D. Megaw

Smithburn, K. C., Haddow, A. J. & Gillett, J. D. **Rift Valley Fever. Isolation of the Virus from Wild Mosquitoes.** *Brit. J. Exper. Path.* 1948, Apr., v. 29, No. 2, 107–21.

See *Bulletin of Hygiene*, 1948, v. 23, 835.

Smithburn, K. C. **Rift Valley Fever ; the Neurotropic Adaptation of the Virus and the Experimental Use of this Modified Virus as a Vaccine.** *Brit. J. Exper. Path.* 1949, Feb., v. 30, No. 1, 1–16.

See *Bulletin of Hygiene*, 1949, v. 24, 846.

Smithburn, K. C., Haddow, A. J. & Lumsden, W. H. R. **Rift Valley Fever ; Transmission of the Virus by Mosquitoes.** *Brit. J. Exper. Path.* 1949, Feb., v. 30, No. 1, 35–47, 1 fig.

See *Bulletin of Hygiene*, 1949, v. 24, 846.

RABIES

Kanazawa, K. Sur la culture *in vitro* du virus de la rage. (Troisième mémoire.) [**The Culture *in vitro* of Rabies Virus.**] *Japanese J. Exper. Med.* 1941, Oct. 20, v. 19, No. 5, 129–46. [51 refs.]

In the present paper, the third of the series [see this *Bulletin*, 1937, v. 34, 671] the author is mainly concerned with two problems : (1) can the rabies virus also be grown in a medium consisting of only Tyrode solution and embryonic brain, with the serum omitted ? ; and (2) what influence does the addition of immune serum have on the development of the rabies virus culture ?

In regard to (1) rabbit or horse serum has no influence on the result obtained with the " Fukuoka " rabies strain ; as to other strains, the author tried to culture the strain V.f.D., No. 1 in a Maitland type medium with very inconsistent results. He also attempted to replace the rabbit brain of the medium with chicken brain ; positive results were obtained but less regularly than with the former. The difference in antigenic structure between the two strains referred to above was clearly demonstrated with the aid of strain-specific neutralization tests. On substituting somatic chick embryo tissue for chick embryo brain, the author found that in every case the virus had completely disappeared after the second generation, the neurotropic properties of the virus being thereby again demonstrated.

In regard to (2) the addition of immune serum was found not only to arrest the growth of the virus but also to neutralize it completely. Contradictory results obtained by Rivers and his co-workers and by Andrewes are explained as being due to the use of a different strain of rabies virus and of a probably

less potent antiserum. [One statement of the author seems open to question, *viz.*, that he found the supernatant of a brain suspension invariably to contain more virus than the sediment. Such finding could only have been obtained if he had not titred the sediment directly but, after regrinding, had washed it with Tyrode solution (added to make up the original volume) and then, after recentrifuging the suspension, had titred the supernatant only.] *G. Stuart*

GOYAL, R. K. **Estimation of the Immunizing Potency of Antirabic Vaccines.** *Indian J. Med. Res.* 1948, Apr., v. 36, No. 2, 149–57.

The Habel test with certain modifications (challenge up to the 21st day and mice up to 26 grammes) was used for the assay of various batches of 5 per cent. Semple-type anti-rabies vaccine. Results between 100 and 1,000,000 MLD protection were achieved. [This variation seems too wide to admit of probability.] An interesting series of experiments was also carried out to determine the period required for formalin, phenol and chloroform, in varying concentrations, to kill the virus.

Complement-fixation tests were then tried for the evaluation of vaccines. Vaccine two months old was centrifuged and the supernatant, heated for 30 minutes at 56°C., was used as antigen ; inactivated rabbit antiserum provided the antibody. Specific complement fixation regularly occurred, but no correlation between the titres obtained by this method and the titration *in vivo* was demonstrable. The method was, therefore, discarded.

For the evaluation of vaccines a flocculation test, with the same antigen and source of antibody, was devised, the mixtures being incubated for 23 hours at 45°C. Flocculation occurred also, however, with normal brain, but, after absorption of the serum with normal brain, there ensued no flocculation, when virus-containing brain was used as antigen.

[The existence of antibrain antibodies would thus appear to have been demonstrated.] *G. Stuart*

RAO, R. S.; DOGRA, J. R. **Studies on Antirabic Vaccines. Part I. Immunizing Value of Antirabic Vaccine** [RAO & DOGRA]. *Indian J. Med. Res.* 1948, July, v. 36, No. 3, 271–6. [10 refs.] **Part II. A Canine Antirabic Vaccine** [DOGRA]. *Ibid.* Oct., No. 4, 291–4.

Part I.—The Habel test has been employed to the satisfaction of the authors for evaluating the Semple type anti-rabies vaccine prepared in different Institutes in India. The vaccine is made from sheep brain, a 5 per cent. suspension being employed in all but the Calcutta Pasteur Institute, where a 2 per cent. suspension is used. The final concentration of phenol is 0·5 per cent. The m. l. d. protection values obtained averaged $10^{-4.5}$, with the exception of the 2 per cent. vaccine, which titred only $10^{-3.8}$. The generally higher protection values obtained in the earlier determinations were rightly ascribed to the use at the time of older mice, which also produced a lower titre for challenge purposes.

One experiment is noteworthy : twice as good results followed the use of chloroform-inactivated, than of phenol-inactivated comparable rabbit brain vaccine.

Part II.—By means of the Habel test the efficacy of a canine anti-rabies vaccine was compared with that of a 5 per cent. Semple type vaccine. A sheep brain emulsion was prepared by adding 160 cc. of saline with 1·25 per cent. phenol to every 100 gm. of brain tissue and this was incubated for 24 hours at 37°C. ; it was then diluted with glycerin to make a 25 per cent. suspension and reincubated at the same temperature for another 6 days. [It is not clear

whether the rabies virus had been completely killed by this procedure. To the reviewer it seems unlikely.]

The usual technique for carrying out the Habel test was followed, except that in the case of the canine vaccine only one injection containing the same amount of brain as the 6 injections of the human type vaccine was given. Results showed the immunizing power of the canine vaccine to have been *nil*, while the Semple vaccine gave good mouse protection.

[This result may very well be due to differences in the immunizing schedule which make the findings non-comparable.] Differences in the virus content of the brains used for the production of the vaccines were overcome in a subsequent experiment where one brain was divided and used as substrate for the two kinds of vaccines to be compared. *G. Stuart*

KLIMT, C. Tierexperimenteller Vergleich der Immunisierungsfähigkeit von phenolisierter mit UV-Licht inaktivierter Lyssavakzine. [**Experimental Comparison in Animals of the Immunizing Capacity of Phenolized and UV-inactivated Rabies Vaccines.**] *Wien. med. Woch.* 1949, Oct. 8, v. 99, Nos. 39/40, 462–5, 3 diagrams. [21 refs.]

The Habel test, used to compare phenol-inactivated anti-rabies vaccines (Hempt and Semple methods) with UV [ultra violet]-inactivated vaccines made from the same strain of fixed virus, showed a consistent superiority of the latter, varying between a 7-fold and a 60-fold higher LD_{50} protection.

In cross-immunity tests between the Novi Sad strain of fixed virus on the one hand and two Paris strains on the other, it was found that very little cross-immunity was conferred, although the relative superiority of the UV-inactivated vaccines was demonstrable throughout.

Comparisons of the times at which death occurred showed that deaths in mice began 2 days later when inoculated with the Novi Sad strain than when inoculated with the Paris strains. The phenomenon of tissue interference was exemplified in these experiments by the frequently higher survival rate after infection with the 10^{-1} dilution than with the 10^{-2} dilution. It was also shown that deaths in vaccinated animals may start 2 days before deaths in the unvaccinated controls, and may continue to occur for 4 days after the death of the last control animal.

The conclusion is reached that inactivation of the rabies virus by UV light preserves the antigenicity in a much higher degree than inactivation with either phenol or phenol and ether combined.

In view of the poor cross-immunization observed between the Novi Sad and the Paris strains of fixed virus, it is suggested that the production of a polyvalent vaccine should be envisaged. *G. Stuart*

DWIVEDI, J. K. **Paralysis of Urinary Bladder after Antirabic Treatment.** *J. Indian Med. Ass.* 1949, July, v. 18, No. 10, 393.

A Hindu male of 41 had been receiving anti-rabies inoculations daily for about a fortnight as a result of a bite from a rabid dog. The day after the 11th injection (which had been followed by a high temperature) he noticed that he could not pass urine freely and the next day he was quite unable to pass any. A thorough examination excluded local and general causes of the condition and a diagnosis was made of paralysis of the urinary bladder after anti-rabies inoculation. Complete recovery followed the administration of large doses of vitamin B within 12 days.

The author discusses the nature and incidence of paralytic accidents after anti-rabic treatment. This is the first such complication noted during the

year in which the treatment centre has been operating in Mathura District Hospital. [The source and nature of the vaccine are not stated.]

H. J. O'D. Burke-Gaffney

VAZ, E. Proteção do homem contra a raiva. (Dados sucintos da situação do problema no Brasil sob o aspecto social). [**The Protection of Man against Rabies. (Brief Statement on the Social Aspect of the Problem in Brazil.)**] *Rev. Hig. e Saúde Pública.* 1948, Apr.–Dec., v. 6, Nos. 2, 3 & 4, 159–68. [11 refs.]

The author recalls that in European countries from which rabies has been eradicated, legislation providing for adequate control measures—enumeration of the canine population, licence tax, capture and destruction of ownerless dogs, quarantine, etc.—has long been in force. The earlier type of specific anti-rabies treatment was necessarily limited in large measure to the inhabitants of towns in which Pasteur Institutes had been established but, thanks to the discovery by FERMI in 1906 of a phenolized vaccine with keeping properties, the extension of treatment facilities to rural populations was, by decentralization, rendered possible. In full realization of the benefits likely to accrue from such decentralization, the Pinheiros Institute of São Paulo, Brazil, organized in 1930 a service sufficiently comprehensive to meet the treatment needs of Brazil and Paraguay. As a result, during the period 1938–1946, there were treated with success over 20,000 bitten persons in 728 different areas in the two countries, many of which areas were far removed from the nearest town.

In the author's view, private initiative of this nature should be not only accepted but encouraged by public services. The plan on which the campaign against rabies should be based comprises : (*a*) the immediate organization of an extensive, decentralized, anti-rabies service with a central laboratory, and as many treatment centres as possible throughout the country ; and (*b*) the compulsory application of such control measures as the registration, vaccination and licensing of dogs, the capture and destruction of stray dogs and the quarantine of dogs arriving in the country from abroad. *G. Stuart*

CHOLERA

GREENWOOD, M. **A Cholera Centenary.** *Brit. Med. J.* 1949, Oct. 8, 797.

Greenwood, in the last article published before his regretted death, commemorates the work of William Baly who was responsible for a report on cholera which was published one hundred years ago by the College of Physicians. In commenting on Baly's report Greenwood refers to the opinions held in the earlier part of the nineteenth century on the nature and origin of epidemic diseases ; more importance was then attributed to tainted air, or miasma, than to contagion. Jakob Henle, however, in 1840, considered that only malaria would then be regarded as purely miasmatic ; syphilis, scabies and hydrophobia would be regarded as purely contagious, and all others—smallpox, measles, cholera, etc.—he classified as miasmatic-contagious.

Henle " put forward the idea of a living contagion, perhaps a minute vegetable organism, as the specific biological cause of each disease," but " could not *demonstrate* any such *contagium vivum* in connexion with human epidemic diseases, excluding scabies."

Baly in his report did not refer to Henle but he was aware of Snow's conclusion that cholera was a water-borne disease. He rejected that suggestion, but the evidence later arising from the epidemic of 1854 was not available at

the time of his report. His opinion was that the cholera poison was not a vapour or miasma but a solid " something " conveyed by air currents. " If this ' something ' reaches a low-lying district, harbouring a poverty-stricken, overcrowded population where filth accumulates, then cholera will arise."

In spite of Baly's recognition of the observed lines of spread of Asiatic cholera to Europe and America in the paths of human intercourse, and its entry by ports and extension by waterways, he had not accepted the likelihood of continuance of cholera in a ship by the persistence of a *contagium vivum* in the bodies of cholera patients.

Baly's recommendations on preventive measures against cholera were those accepted at the time for mitigation of all epidemic diseases. On the question whether the endorsement of Snow's theory as to the water-borne origin of cholera would have resulted in the saving of many lives Greenwood thinks that the answer must be " No."

The paper concludes with the words " There is a sentence in Baly's report which was only too true.

' Quarantine can no longer be adopted as the means of preventing the entrance of Cholera into England ; for it is incompatible with the present state of commercial intercourse, and with the well-being of a commercial country.'

Perhaps quarantine would not have kept cholera out, but time was to show that something more than fear of epidemics was needed to persuade the electorate to clean up the country." *J. Taylor*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

Sautet, J., Asseo, S. & Cami, R. Influence de l'alimentation de disette sur le parasitisme intestinal à Marseille (1945). [**The Influence of Malnutrition on Intestinal Parasitism in Marseilles (1945).**] *Rec. Travaux Inst. Nat. Hyg.* Paris. 1948, Tome 3, v. 2, 551–7.

Food shortages and deficiencies have played an essential rôle since the war in increasing intestinal parasitism. Further, other conditions in Marseilles contributed to this increase, for example the shortage of chemical and animal manures led to the extensive use of human manure.

The results of the examination of the stools of 200 persons are reported. A direct microscopic examination was made of a preparation from a fresh stool specimen and then of one after enrichment by the method of Telemann-Rivas. No account was taken of the presence or absence of *Enterobius*.

Of the 200 subjects 168 (84 per cent.) showed parasites ; 54 showed the eggs of helminths and 150 the cysts of protozoa. Men showed parasites more frequently than women—88·7 per cent. compared with 71·3 per cent.

The percentage findings of the different species were :—*Trichuris*, 25 ; *Ascaris*, 3 ; *Hymenolepis nana*, 1 ; *Entamoeba histolytica*, 26 ; *E. hartmanni*, 5 ; *E. coli*, 48 ; *Endolimax nana*, 21 ; *Iodamoeba bütschlii*, 8 ; *Giardia intestinalis*, 10 ; *Chilomastix*, 5 ; *Enteromonas*, 5 ; *Embadomonas*, 1 ; *Blastocystis*, 35.

If the population was divided into autochthonous and foreigners (including French-born Corsicans), the former showed an 80 per cent. parasitization and the latter 91·4 per cent. The non-antochthonous person showed a higher percentage parasitization with the amoebae.

The most striking facts are the large number of carriers of *Entamoeba histolytica* ; these show a great increase on the figures given by Bidegaray for

Paris (4 per cent.), PRINGAULT (1921) for Marseilles (4·66 per cent.) and even those of CHORINE and TANGUY (8·3 per cent.) from *l'Institut Pasteur*, Paris, where the figures would be augmented by the number of colonials who attend for consultations on tropical diseases.

On the other hand it is interesting that the figures for *Ascaris*, *Giardia* and *Blastocystis* are remarkably constant in all the surveys ; the increase that one might expect in association with an increase in food contamination is absent.

The rarity of ankylostomes and *Clonorchis* is probably due to the decreased contact with tropical countries since 1940.

The practical point of the enquiry is that the greatly increased incidence of carriers of amoebae of the dysentery type is a threat to public health.

L. E. Napier

YOELI, M., STEINITZ, H., GERICHTER, C. & RABINOWICZ, K. **The Incidence of Intestinal Infections in Kitchen-Personnel of the Army.** *Harefuah.* Jerusalem. 1949, Oct. 2, v. 37, No. 7. [In Hebrew 83–4. English summary 84.]

In the latter half of 1948, the authors, in Jerusalem, examined the stools of 496 military food handlers who were free from intestinal symptoms.

The results are shown in four tables : from these it is revealed that 43·1 per cent. of the men had harboured intestinal parasites, of which 37·3 per cent. were helminths. Among the protozoa, *E. histolytica*, *Iodamoeba bütschlii* and *Giardia intestinalis* accounted for 3·0, 2·2 and 3·0 per cent. respectively. The authors comment on the similarity of these figures to those of RICKARDS for R.A.F. men returning from the Mediterranean area [this *Bulletin*, 1949, v. 46, 361].

Of the helminthic infestations, *Trichuris* accounted for 30·9 per cent., *Ascaris* for 13·1 per cent., and others for 0·2 to 1·6 per cent. It is also demonstrated that these worm infestations were very much higher among the Sephardic than the Ashkenasic communities : for example, 147 of the former showed 56·5 per cent. of infestations as compared with 24·8 per cent. among 303 of the latter and the infestations with individual species were correspondingly high. The high infestation rate in the Sephardic community is attributed to differences in habits, environment and exposure to infection.

H. J. O'D. Burke-Gaffney

DICKSON, R. C. & ROSS, Marion. **Amoebiasis in Veterans.** *Canadian Med. Ass. J.* 1949, July, v. 61, No. 1, 13–18, 1 fig.

Normally amoebiasis is rarely encountered in Canada, and surveys of small samples have shown only 1 to 2 per cent. of the population to be infected. Canadian servicemen served in highly endemic areas during the war, and it appeared desirable to investigate the incidence of *Entamoeba histolytica* infection in them after their return to Canada. Of 1,457 subjected to stool examination, 258 were found to harbour the parasite. The difficulties in the recovery and recognition of the parasite are stressed ; and reference is made to the doubtful association of a patient's symptoms with the parasitic infection. The clinical findings in these cases are analysed and the treatment used is described.

[The authors perpetuate two gross mis-statements which unhappily gained some credence during the war years, in spite of repeated contradiction by recognized authorities. It cannot be re-stated too categorically that the cysts of *Entamoeba histolytica* morphologically are entirely characteristic, and so are readily specifically identifiable ; it is the amoebae which are more difficult to

differentiate from allied parasites. No evidence has ever been adduced of any value in "a provocative dose of emetine hydrochloride" for the diagnosis of amoebiasis.] *A. R. D. Adams*

ROYO MONTAÑES, M. Disenteria amebiana en el lactante y niño pequeño. [**Amoebic Dysentery in Infants and Young Children.**] *Med. Colonial.* Madrid. 1949, Sept. 1, v. 14, No. 3, 223–36. [12 refs.]

MOHR, W. Röntgenuntersuchungen bei tropischen Dickdarmerkrankungen [**Radiological Investigation of Tropical Intestinal Conditions.**] Reprinted from *Fortschritte a. d. Gebiete d. Röntgenstrahlen.* 1939, v. 60, No. 1, 14–35, 18 figs. [Numerous refs.]

This study, illustrated with 18 beautifully executed radiograms, obtained by the double-contrast (Barium enema) method is based upon a study of 215 cases of widely different aetiology, consisting of 49 amoebic infections, 18 sequelae of amoebiasis, 13 bacillary dysenteries, 44 cases of unspecified colitis, 17 of mucous colitis, 9 of chronic constipation, 4 of schistosomiasis (*S. mansoni*), 3 of lambliasis, 1 of balantidiasis, 15 of different bowel conditions, including tuberculosis and carcinoma, 10 of sprue and 32 normal findings. Considerable attention was paid to filling defects in acute and chronic amoebic dysentery in an attempt to demonstrate a characteristic picture. The author regretfully confesses that any marked differentiation between all the various stages of colitis gravis (ulcerative colitis) and various tropical bowel infections cannot be substantiated. No parallel seemed to exist between the radiological picture and the results of sigmoidoscopy with the possible exception of that in amoebic dysentery. In many cases diagnostic criteria were obtained from radioscopy where sigmoidoscopy had failed, but in no instance should a thorough faeces examination be neglected. The details are made clear by a table based upon these various diagnostic methods. *P. Manson-Bahr*

BARROUX. Image radiologique de déformation diaphragmatique "en brioche" dans une hépatite amibienne, sans suppuration collectée. [**Radiological Picture of Diaphragmatic Deformity "*en brioche*" in Amoebic Hepatitis without Localized Suppuration.**] *Méd. Trop.* Marseilles. 1949, May–June, v. 9, No. 3, 447–9.

BECKERMANN, F. & MOHR, W. Röntgenologische Erfassung eines Amöbenabszesses nach Kontrastanreicherung der Leber mit Jodsol. [**Radiological Diagnosis of Amoebic Abscess by the Iodosol Contrast Method.**] Reprinted from *Röntgenpraxis.* 1941, v. 13, No. 1, 14–18, 3 figs. [12 refs.]

This paper represents the results obtained in demonstrating the outline of amoebic liver abscess with contrast material. This method is specially useful in differentiating liver abscess from diffuse hepatitis. The details of a case are recorded which bring out this very point. The liver shadow was outlined by the administration of iodosol. The abscess cavity is represented by a more opaque shadow and the upper limit is clearly shown by a gas bubble.
P. Manson-Bahr

STEINITZ, H. **The Value of the Complement Fixation Test in Amoebiasis.** *Harefuah.* Jerusalem. 1949, Oct. 2, v. 37, No. 7. [In Hebrew 84–7. (15 refs.) English summary 87–8.]

The author studied some 70 cases of abdominal disorders in Palestine most, but not all, of which clinically suggested amoebiasis : stool examinations were

made and the implication in the author's English summary is that these were negative.

The complement fixation test was carried out by Professor Klopstock with his modifications of Craig's method : all cases gave positive results. In about 57 per cent. of cases anti-amoebic treatment gave complete " cure or striking improvement," and the author considers that the results were so convincing that the specific diagnosis was in little doubt : " the positive C.F.T. played a decisive part in the indication of the treatment and its success."

The author suggests that while the complement fixation test is to be considered a specific reaction to amoebiasis, false positive results must be kept in mind : but technical improvements may well make these no more frequent than in other biological reactions.

The point is emphasized that the C.F.T. is not a substitute for, but a supplement to other tests and examinations : and even when it is positive, other diseases should not be overlooked, especially if anti-amoebic treatment is not successful.

The author concludes that the complement fixation test is indicated in chronic intestinal conditions without a definite diagnosis ; in acute and subacute conditions, especially where amoebic hepatitis is suspected, and where immediate examination of faeces is not practicable for any reason.

H. J. O'D. Burke-Gaffney

Sandler, R. **The Value of the Complement-Fixation-Test in the Diagnosis of Amoebiasis.** *Harefuah.* Jerusalem. 1949, Oct., 2, v. 37, No. 7. [In Hebrew 88–90. English summary 90.]

This author also studied the complement fixation test (again in the laboratory of Professor Klopstock) in 174 ambulatory patients having chronic abdominal conditions. In 23 cases, the blood was examined immediately after *E. histolytica* had been detected : 13 were positive at the first examination and 6 only at the second. In 108 cases in which stools were negative, the complement fixation test was positive in 73 per cent. of clinically suspicious cases (63) but in only 10 per cent. of cases not suspected to be amoebiasis (45).

Control tests were confusing. Five of ten positive cases became negative before treatment was begun. After treatment, 17 of 32 positive cases became negative but 8 reverted to positive within 1 to 12 months. Later, 6 more cases became negative. No correlation could be determined between these variable results and the clinical, parasitological and therapeutic factors.

The author considers that a positive C.F.T. is very probable evidence of present or past amoebic infection : it should only be used as a diagnostic aid and not to confirm a cure and negative tests should be repeated. He believes that a positive result justifies anti-amoebic treatment in cases with negative stools where the clinical features suggest an amoebic infection. In Palestine it is of practical value in rural districts, where expert examination for protozoa is not available.

H. J. O'D. Burke-Gaffney

Montel, M. L. R. Les amaebomes. Tumefactions ileo-caeco-coliques pseudo-tumorales avec adenopathies mésentériques et iliaques dues à l'amibiase. [**Ameboma. The Caecal Masses with Mesenteries and Iliac Adenopathies due to Amoebiasis.**] *Méd. Trop.* Marseilles. 1949, Mar.–Apr., v. 9, No. 2, 184–212, 9 figs. [Bibliography.]

The author has had the good fortune to have diagnosed and treated ten cases of amoeboma in Annamese patients who presented a tumour in the right iliac fossa. His attention was first drawn in 1924 to this phenomenon which

he thought was due to an adenopathy amenable to emetine therapy [this *Bulletin*, 1924, v. 21, 470].

In the present series all, save two, had suffered from dysentery, some intestinal disturbance, or false constipation. The patients themselves complained of vague abdominal pains and general fatigue. Rarely they had noticed the iliac tumour. There was usually an irregular pyrexia. The stools were inconstant, with alternating diarrhoea and constipation.

The amoeboma itself is represented by a more or less mobile tumour, round or oval in shape, but with a diffuse irregular margin, in size varying from that of a mandarin to that of a large orange (10 cm.×8 cm.), dull to percussion. The lower margin was limited by the median and the upper by the horizontal iliac lines. The larger tumours were easily palpable, smaller ones necessitated deep palpation.

Differential diagnosis had to be made from caecal tuberculosis, but in endemic areas the practitioner has always to bear the probability of amoebiasis in mind. Adenopathy due to lymphogranuloma venereum has also to be considered, as has chronic appendix abscess. The value of this paper is enhanced by a historical review and documentation, but the illustrations of the pathology and radioscopy are borrowed from other published sources, mainly after Flavio Niño [see this *Bulletin*, 1943, v. 40, 145]. *P. Manson-Bahr*

Ibrahim, M., Sorour, A. & Sherif, A. **Some Clinical Aspects of Hepatic and Gall-Bladder Amoebiasis with Case Reports.** *J. Roy. Egyptian Med. Ass.* 1949, June–July, v. 32, Nos. 6/7, 538–47.

In cases of intestinal parasitization with *Entamoeba histolytica* the liver is constantly subjected to attacks by amoebae, most of which it overcomes. If it fails to repell the amoebic invasion one of the following pathological reactions follows :—(1) Simple congestion ; (2) multiple amoebic abscesses ; (3) solitary abscess ; (4) multifocal abscess ; or (5) chronic amoebic hepatitis. A very few cases of amoebic cholecystitis have been recorded, chiefly by French workers. Hashim [this *Bulletin*, 1934, v. 31, 379] stated that he found amoebae in the mucosa of the gall bladder *post-mortem* in a case of amoebic liver abscess ; Weselmann [this *Bulletin*, 1943, v. 40, 606] reported he had recovered vegetative forms and cysts of *E. histolytica* from the contents of the duodenum by intubation. It would thus seem that infection of the gall bladder with amoebae can result from an ascending infection from the gut by the biliary tract.

The authors in a discussion on the symptomatology of amoebic involvement of the liver and of the gall bladder say that acute and subacute cholecystitis of amoebic origin may occur ; jaundice is very rare. Some illustrative cases of liver and of gall bladder amoebiasis are described. [The diagnosis in these cases was apparently based on the clinical findings and the response to emetine treatment ; in none of them were parasites recorded in the lesions nor was the presence of a gut infection established.] *A. R. D. Adams*

Shanmugaratnam, K. **Amoebic Liver Abscess in an Infant.** *Proc. Alumni Ass. King Edward VII College of Med.* Singapore. 1949, Sept., v. 2, No. 3, 322–4, 1 fig.

A case in a Chinese infant of six months.

Conan, N. J., Jr. **The Treatment of Hepatic Amebiasis with Chloroquine.** *Amer. J. Med.* 1949, Mar., v. 6, No. 3, 309–20, 7 figs. [24 refs.]

Certain pharmacological characteristics of chloroquine made it appear probable that it would act upon amoebic infection of the liver rather than

upon that of the colon. These properties are its extensive localization in the liver (five hundred times its plasma concentration), a three- or four-fold less degree of localization within the intestinal walls and almost complete absorption from the gastro-intestinal tract, as only some 8 per cent. of the daily dose is excreted in the faeces.

In vitro studies (Dr. H. W. Brown) have revealed that chloroquine possesses amoebicidal qualities superior to those of anayodin or carbarsone, but less than that of emetine.

In intestinal amoebiasis, chloroquine has effected symptomatic and parasitological cure in seventeen out of thirty-two cases, with follow-up periods of two to twenty-four months. In hepatic amoebiasis the author has studied seven each of which was successfully treated. In all, some twenty-two have been reported in the literature.

The oral dosage of chloroquine in human amoebiasis was devised with the idea of administering nearly the minimal toxic dosage for a period of two to three weeks in order to allow the drug to exert its maximum anti-amoebic activity. A priming or loading dose of 0·6 gm. of the base (1·0 gm. of the diphosphate) was given daily for two days in order to saturate the tissues. Plasma and tissue concentrations were maintained by continuing the dose of 0·3 gm. base (0·5 gm. diphosphate) daily for two to three weeks. Details of the seven cases are recorded and in all the diagnosis was ascertained on clinical grounds, while *E. histolytica* was demonstrated in six. Probably the most convincing is the summary of an eighth case, details of which are supplied by Murgatroyd and Fairley from London [see also this *Bulletin*, 1949, v. 46, 744]. The toxicity of chloroquine manifests itself in minor toxic manifestations such as mild transient headaches, disturbances of visual accommodation and pruritus and gastro-intestinal complaints.

For the treatment of extra-intestinal amoebiasis the commonest lesions of which are found in the liver, emetine is highly effective and so constitutes a standard for compounds of a similar activity. So far as the patients who received chloroquine alone are concerned, the response to medication appeared just as prompt and complete as would have been expected had emetine been used alone. As can be gathered from the protocols in four cases (including the 8th from London) emetine is not uniformly successful in the treatment of amoebic hepatitis or amoebic abscess of the liver.

Because of the lethal effect of iodine upon cysts of *E. histolytica in vitro* the activity of the iodohydroxyquinolines upon trophozoites in human infections has been attributed to their iodine content, but a comparison of the formula of chloroquine, which contains no iodine, with that of diodoquin (an iodohydroxyquinoline), reveals that the quinoline nucleus is a common denominator.

Should it be finally established that the effects of amoebicidal drugs are correlated to their localization in sufficient concentration within certain tissues, it is possible that one quinoline compound may be discovered which will produce a concentration sufficient in the intestine as well as in the liver to exterminate the amoebae. It is therefore recommended that chloroquine should be employed, in addition to other amoebicides, in the routine treatment of intestinal amoebiasis. *P. Manson-Bahr*

Mukherjee, S. K. **Pulmonary Amoebiasis.** *Indian Med. Gaz.* 1949, June, v. 84, No. 6, 250–52, 2 figs. on pl.

Amoebiasis is protean in its manifestations, but it is claimed that its pulmonary features have been detected only comparatively recently. Clinically these may be classified into the following types: (1) symptomatic, (2) secondary and (3) primary.

(1) *Symptomatic pulmonary amoebiasis* is quite common in its clinical features. On examination the liver is found to be enlarged and tender, while auscultation of the chest reveals a pleural rub.

There is another form in which amoebic abscess and amoebic hepatitis are associated with signs of right basal involvement, characterized by feeble breath sounds and impaired percussion note.

(2) *Secondary pulmonary amoebiasis* is more common, although its incidence is becoming less owing to earlier recognition and effective therapy of amoebic hepatitis.

(3) *Primary pulmonary amoebiasis* is rare and is probably due to embolism from the bowel wall. Clinically two types have to be differentiated :—

(*a*) *Amoebic pneumonitis.*—The pulmonary reaction to amoebic invasion is not characterized by gross tissue destruction. Of all the pulmonary cases it most closely resembles pulmonary tuberculosis.

(*b*) *Pulmonary amoebic necrosis.*—Extensive destruction of pulmonary tissues, simulating lung abscess, characterizes this type.

A case is described in which improvement was progressive after emetine therapy. *P. Manson-Bahr*

Luis Carri, E. Amebiasis intestinal y alergias respiratorias. [**Asthma and Intestinal Amoebiasis.**] *Rev. Kuba Med. Trop. y Parasit.* 1949, May–June, v. 5, Nos. 5/6, 67–70. [20 refs.]

The author has met with several cases—he gives details of six in the present contribution—in which asthmatic attacks have caused much distress and the cause has defied detection for long periods. In some he records testing the allergic response to 40 or more substances, pollen, vegetal and animal extracts, moulds, etc., to some of which a strong response was given, but treatment was ineffectual. Stool examinations revealed the presence of *Entamoeba histolytica* in vegetative or cystic form. Treatment by injections of emetine was started and almost at once the asthmatic attacks were reduced in number and intensity and the improvement was maintained. One patient relapsed later and the *Entamoeba* cysts were again seen. *H. Harold Scott*

Kourí, P., Iriondo, M. & Antonio Peraza, J. Amebiasis cutanea por *Endamoeba histolytica.* [**Cutaneous Amoebiasis.**] *Rev. Kuba Med. Trop. y Parasit.* 1949, May–June, v. 5, Nos. 5/6, 71–9, 18 figs. [10 refs.]

In July, 1946, a man presented himself with an ulcerated growth of the perianal region, diagnosed as epithelioma. A major operation with extirpation of glands was undertaken. A fresh biopsy revealed abundant *Entamoeba histolytica* ; emetine hydrochloride was injected and the patient went away cured. Twenty months later, he returned with a perianal ulcer extending over the perineum, scrotum and the inguino-crural folds. The *Entamoeba* was again found in abundance and treatment by emetine adopted. He was given 4 cgm. daily for six days ; the change was striking—the condition before and after treatment is shown by photographs, and the histological state by a series of photomicrographs. The authors sound the warning that in all patients coming with ulceration of the perineum and adjacent parts the possibility of amoebiasis should be borne in mind. The common diagnosis of carcinoma may lead to unnecessary operation [though the two conditions may co-exist], but the uncomplicated amoebic infection of the skin is very amenable to treatment. [See also this *Bulletin*, 1925, v. 22, 346 ; 1930, v. 27, 386 ; 1932,

v. 29, 254 *bis* ; 1934, v. 31, 651 ; 1937, v. 34, 334 ; 1941, v. 38, 591 ; 1942, v. 39, 32 ; 1945, v. 42, 730 ; 1946, v. 43, 42, 1141 ; 1949, v. 46, 1034.]

H. Harold Scott

HEILBRUNN, A. Amoebiasis vaginae [**Amoebic Vaginitis.**] *Nederl. Tijdschr. v. Geneesk.* 1949, Sept. 17, v. 93 (iii), No. 38, 3268–71.

The English summary appended to the paper is as follows :—

"A case of amoebiasis vaginae in a Dayahwoman from West-Borneo." [See this *Bulletin*, 1949, v. 46, 742.]

SCHNEIDER, J. & MONTÉZIN, G. Amibiase expérimentale et amibiase spontanée du rat. Mise au point d'une technique. [**Experimental and Spontaneous Amoebiasis in the Rat. Description of Technique.**] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 3/4, 94–6.

In a previous paper [this *Bulletin*, 1949, v. 46, 259] the authors noted the difficulty of determining the presence of *Entamoeba histolytica* in rats experimentally inoculated with cultures of this parasite, owing to possible confusion with *E. muris*, with which these animals are commonly infected.

In the present work this difficulty was overcome by eliminating those rats which were found to harbour *E. muris* and by employing a virulent strain of *E. histolytica* for the inoculation of rats free of infection with their natural parasite. Using the technique employed by Jones and others, *i.e.*, intracaecal inoculation of 0·3 cc. of a culture of *E. histolytica*, they succeeded in producing an infection in 36 out of 37 young rats. The results were assessed by microscopical examination of the caecal contents, while the macroscopical appearance of the caecum was not taken into consideration, since it was found to be inconstant and due to injuries caused by the operation, as demonstrated in rats subjected to the same procedure but without inoculation of the amoebae. The findings in the rats were confirmed by growth in culture of the amoebae recovered from the caecal contents. This again excludes *E. muris* which does not develop in the ordinary media used for the human parasite.

C. A. Hoare

KESSEL, J. F. & JOHNSTONE, H. G. **The Occurrence of** *Endamoeba polecki*, **Prowazek 1912, in** *Macaca mulatta* **and in Man.** *Amer. J. Trop. Med.* 1949, May, v. 29, No. 3, 311–17, 11 figs. on 1 pl. [16 refs.]

An examination of 42 monkeys (*Macaca mulatta*) harbouring natural infections with *Entamoeba histolytica* revealed in 26 animals the presence of another amoeba, which the authors attribute to *E. polecki*, a species described by Prowazek (1912) and subsequently by Kessel (1928) from pigs. A similar amoeba was also reported from macaques by Swellengrebel (1914) under the name *E. chattoni*. Prowazek also found *E. polecki* in a child, and the present authors have encountered what appears to be the same entamoeba in two human cases. In these the trophic amoebae were not seen but numerous cysts were present. While the simian amoebae could not be cultivated in the usual media, cysts from the human host grew readily in a medium consisting of an egg-Ringer solution slope covered with Locke's solution and containing rice starch.

When seen in fresh faecal preparations, the movements of *E. polecki* were like those of *E. coli*, *i.e.*, sluggish, without marked pseudopodia, but in cultures

amoebae of the human strain of this species were more active and showed distinct hyaline pseudopodia. Judging from the cytoplasmic contents this amoeba feeds on bacteria, yeasts and other protozoa. The cysts of *E. polecki* measure from 8 to 15 μ in diameter (average 12 μ) and typically contain a single nucleus with a large karyosome and peripheral chromatin evenly or unevenly arranged on the nuclear membrane. Chromatoid bodies are rod-shaped or spherical and there is commonly present a dark-staining rounded cytoplasmic inclusion ("inclusion mass") which does not react like glycogen. [In his *Précis de Parasitologie* (1936, 1949), BRUMPT depicts, under the name "*masse chromophile*", similar inclusions in typical *E. histolytica*.]

The authors emphasize the importance of differentiating *E. polecki* and *E. histolytica* both in monkeys used for testing amoebicidal compounds and in human infections.

[The revival of Prowazek's *E. polecki* as a human parasite raises some doubts which can only be settled by further investigations. In the meantime it should be noted that the validity of the specific name *E. polecki* has recently been challenged by the reviewer (*Parasitology*, 1940, v. 32, 226) who rejected it as *nomen nudum*.] *C. A. Hoare*

KESSEL, J. F. & KAPLAN, Fay. **The Effect of certain Arsenicals on Natural Infections of *Endamoeba histolytica* and of *Endamoeba polecki* in *Macaca mulatta*.** *Amer. J. Trop. Med.* 1949, May, v. 29, No. 3, 319–22.

In a previous paper KESSEL and JOHNSTONE [above] have established the presence in monkeys (*Macaca mulatta*) of natural infections with *Entamoeba histolytica* and *E. polecki*. In the present paper the authors compare the effects of melarsen (oxide), mapharsen and carbarsone on infections with these two amoebae in monkeys. These arsenicals were administered in a dose of 50 mgm./kgm., 10 mgm./kgm. and 7·5 mgm./kgm. respectively per day over a period of 10 days and the results are shown in three tables, from which it is seen that infections with *E. histolytica* were considerably reduced by the treatment, while the effect upon *E. polecki* infections was only slight, and corresponded to the effect of these drugs on other commensal protozoa. It is pointed out that, in view of the similarity of the cysts of *E. polecki* and uninucleate cysts of *E. histolytica*, care should be taken to differentiate these two species when assessing the results of tests with amoebicidal drugs carried out on monkeys. *C. A. Hoare*

GOUR, K. N. **Emetine in Giardiasis.** *J. Indian Med. Ass.* 1949, July, v. 18, No. 10, 391–2.

The author has met cases of *Giardia intestinalis* infection in which mepacrine was ineffective or unsuitable, but which responded to injections of emetine hydrochloride. He gives case reports of five such patients, all of whom became free of *Giardia* after 4, 4, 2, 1 and 2 injections respectively. Each daily injection consisted of 1 grain of emetine hydrochloride mixed with 1/60th of a grain of strychnine hydrochloride: it is recommended that four such injections should be given.

It is pointed out that emetine is useful where mepacrine cannot be given or where amoebic and *Giardia* infections co-exist. [No side-reactions are mentioned.] *H. J. O'D. Burke-Gaffney*

RELAPSING FEVER AND OTHER SPIROCHAETOSES

Heisch, R. B. & Harvey, A. E. C. **Experimental Transmisson of *Spirochaeta turicatae* Brumpt, by Lice.** *East African Med. J.* 1949, June, v. 26, No. 6, 164–6.

The authors employed a strain of *S. turicatae* obtained from North America where it causes a form of tick-borne relapsing fever. A monkey infested with lice (*Pedicinus longiceps*) was infected with the spirochaete and lice were removed at intervals for inoculation into rats or mice. Spirochaetes were present in the monkey's blood from the 2nd to the 25th day ; lice were found infective from the 6th to the 35th day, though the organisms were invisible. Human lice were also tested after feeding for three days on heavily infected rats. Four days after the first feed, ten of these lice were uninfective on inoculation, but on the next day and up to the 14th successful transmissions were made. Spirochaetes were again invisible in the insect, but another experiment in which the lice were kept alive for 17 days demonstrated the existence of metacyclic forms. The authors point out that the lice became infective at an early stage long before the appearance of metacyclic forms. Francis in America [this *Bulletin*, 1939, v. 36, 760] and Baltazar in Teheran have also succeeded in infecting lice with this species of spirochaete.

P. C. C. Garnham

Chakrabarty, A. **Relapsing Fever (Louse-borne) in North-East Bengal.** *J. Indian Med. Ass.* 1949, June, v. 18, No. 9, 352–3.

A report of 9 cases in labour recruits in a district where the disease had not been reported.

Coghill, N. F. **Clinical Manifestations of Tick-borne Relapsing Fever with special reference to the Disease in Cyprus.** *J. Roy. Army Med. Corps.* 1949, July, v. 92, No. 7, 2–33, 9 charts. [83 refs.]

Records were collected of 35 military cases of relapsing fever infected in Cyprus and which came under the author's care. Of these 29 were Indians, one a Cypriot and five English, the blood films being positive in all cases. The clinical manifestations are fully described and the possibility of clinical differentiation between tick-borne and louse-borne relapsing fever is considered, and the literature fully discussed. The author remarks that the symptoms in any case in the first attack may be not unlike those of many other conditions, that there may be few symptoms and signs and that there are considerable similarities between the two forms of the disease. Early examination of a blood film is the best means of sure diagnosis.

As a result of analysis of the literature on the subject he concludes that the following manifestations are more common in tick-borne than in louse-borne relapsing fever, *viz.*, two or more relapses (in untreated cases), scanty spirochaetes in the peripheral blood, paroxysms of not more than five to seven days, prolonged irregular fever, vomiting usually only with meningitis, lethargy, weakness, giddiness, and loss of weight, neurological complications of which the commonest are lymphocytic meningitis and cranial nerve palsies, ocular complications, chiefly papilloedema and iridocyclitis, poor therapeutic effects of the organic arsenicals, illness relatively less severe and mortality usually low.

In the louse-borne form the following are more common : less than two relapses, often none, spirochaetes numerous in the peripheral blood, longer paroxysms, vomiting at any stage, haemorrhagic manifestations of all kinds,

diarrhoea, jaundice, fair results with arsenicals, illness relatively more severe, mortality often high, perhaps aural complications, chiefly tinnitus and deafness. The author admits that only very partial success has been achieved in the attempt to differentiate on clinical grounds between tick-borne and louse-borne disease and he stresses the fact that one of the greatest difficulties is the lack of evidence in most publications as to the vector, a plea being made that in future more attention be paid to this point. There was no mortality in the series described. Thirteen cases are described in detail, treatment being with novostab or sulphostab.

[For fuller details the reader must be referred to the original paper.]

C. F. Shelton

Bergeret, C. & Raoult, A. Notes sur les formes nerveuses de la fièvre récurrente. Fièvre récurrente à tiques en Afrique Occidentale Française. [**Nervous Forms of Tick-borne Relapsing Fever in French West Africa.**] *Bull. Méd. de l'Afrique Occidentale Française.* 1948, v. 5, No. 2, 271–9.

The following neurological types of relapsing fever are met with in and around Dakar and in the Cape Verde peninsula.

(1) The purely *meningeal* type is the commonest, being found in nearly half the 57 cases observed. In the average patient it is only towards the end of the third week of illness that the cerebrospinal fluid becomes normal, and headache which is often very severe is probably connected with a meningeal congestion which may not show itself in the cerebrospinal fluid. This term should only be used in cases showing the clinical picture of an acute meningitis : intense headache, vomiting, photophobia, Kernig's sign, and all the classical signs of a syndrome which does not differ from a bacterial meningitis, the only distinction being the fact that the cerebrospinal fluid remains clear.

In a series of 20 cases the changes in the latter are described. Pleocytosis is very variable, ranging from ten to several thousand cells per cmm., lymphocytes predominating, while the protein content is never above one gramme per 100 ml. Spirochaetes have never been found on direct examination of the deposit from the cerebrospinal fluid after centrifugation, but inoculation of the fluid into mice gives results as constant as that of citrated blood. Diagnosis of the meningeal form and the criterion of cure are by the above examinations.

(2) *Peripheral nerve paralyses.* The nerves most often affected are the facial, the vestibular and the trigeminal. The susceptibility of the facial is such that its involvement sometimes enables a diagnosis to be made in retrospect, and five illustrative cases are described. The vestibular nerve is the next most frequently attacked and it is not uncommon during the course of a pyrexial attack and even long afterwards for patients to experience transient vertigo accompanied by abnormal auditory sounds. In one instance the patient was quite unable to stand upright for three days, the condition yielding to tryparsamide. Affection of the trigeminal, either alone or associated with facial paralysis, manifests itself either by the most intense neuralgia, by hyperaesthesia, or by anaesthesia of the face and cornea.

(3) The *medullary* (spinal) type is commonest amongst the African population. One case in an African female is reported in detail. The patient showed signs of a spastic paraplegia and was quite unable to leave her bed. Direct examination of smears from the blood and bone marrow were negative but inoculation of blood into mice on the fifteenth day of illness showed the presence of *Trep. duttoni*, and treatment with tryparsamide caused a rapid improvement, the patient leaving hospital and walking normally two and a half months after

admission. A final injection of cerebrospinal fluid into a mouse before discharge was negative.

(4) The *meningo-encephalitic* type. Cases showing epilepsy, either generalized or of the Jacksonian type, cerebellar symptoms, acute mania and delirium have been described. One case with a cerebellar syndrome and another with lethargic symptoms are described, both patients being successfully treated with tryparsamide.

Neurological types of relapsing fever are often intractable and prone to relapse but the prognosis as regards life is very good.

Tryparsamide and acetylarsan have been found to give the best results. As a routine tryparsamide is administered intravenously in a dosage of two centigrammes per kilo of body weight every four days for 20 injections and any febrile reaction can be prevented or mitigated by a preliminary intravenous injection of 5 ml. of a 1 per cent. solution of novocaine. Tryparsamide is considered more effective in patients with cerebral or nervous symptoms but the temperature is not controlled as quickly as with acetylarsan and permanent cure is not as certain as with the latter drug and orsanin. Trial of a combination of 0·5 gm. of moranyl and 1·5 gm. of tryparsamide (adult dose) is suggested : but the authors have only used this combination exceptionally. It is recommended that acetylarsan be given at intervals of two or three days, but severe reactions may occur if it is given when the temperature is high. During the acute phase, acetylarsan is the drug of choice in Europeans, novarsenobillon in Africans ; one injection is given every three days for six injections and followed by tryparsamide (2 cgm./kgm. for four days) ; a watch is kept for meningeal symptoms. Tryparsamide is given from the start if signs of meningitis have already appeared ; lumbar puncture is valuable.

At first, small doses of 50,000 to 60,000 units of penicillin were administered and it was interesting to note that in these early days an exacerbation of symptoms occurred and that spirochaetes appeared in increased numbers in the blood. Later, doses of 2,500,000 to 3,000,000 units in a week were given with very satisfactory results, although one drawback to this drug appeared to be its feeble diffusibility through the meninges ; it is suggested that in cerebral types it should be given into the cerebrospinal fluid. A case described by Lebon and Choussat (*Algérie Médicale*, Sept. to Dec. 1945) is referred to. In spite of very alarming symptoms of acute meningo-encephalitis and after failure of treatment with sulpharsenol cure was brought about by administration of 500,000 units of penicillin injected intramuscularly and into the cerebrospinal fluid. *C. F. Shelton*

Darwish, A. E. **The Effect of Penicillin on the Behaviour of Spirochaetes in Natural and Inoculated Relapsing Fever.** *J. Roy. Egyptian Med. Ass.* 1949, Aug., v. 32, No. 8, 605–9.

Six paroxysms in four patients suffering from naturally-contracted relapsing fever were treated with penicillin in doses of 20,000 units given intramuscularly every three hours ; the spirochaetes disappeared from the peripheral blood and the temperature subsided after three or four injections. In spite of this apparent rapid cure, all four patients reported two subsequent relapses and improvement was considered to be due to spontaneous remission rather than the effects of the drug. The duration of fever before treatment was begun is not given. Mice inoculated intraperitoneally with 2 ml. of the patient's blood taken before each penicillin injection all became infected after 21–25 hours.

One patient with neurosyphilis was successfully infected by intravenous inoculation of 2 ml. of blood from a case of relapsing fever, the incubation period being four days. Sixteen injections of 20,000 units of penicillin were required to

produce disappearance of spirochaetes after 45 hours : eight days later a relapse occurred and 19 injections were needed. Termination of the attack after penicillin treatment was not preceded by gradual reduction in the number, motility or infectivity to mice of the spirochaete, but occurred with sudden disappearance of the organisms. *C. F. Shelton*

BERGERET, C. Essais de traitement de la fièvre récurrente à tiques dakaroise par le S.T.B. [**Trials of S.T.B. in the Treatment of Tick-borne Relapsing Fever at Dakar.**] *Bull. Méd. de l'Afrique Occidentale Française.* 1948, v. 5, No. 2, 343–6.

S.T.B., a trivalent arsenical compound [not further described], has been found effective in the treatment of yaws. A note is given of its use in seven cases of tick-borne relapsing fever, five being treated in the first attack and two having neurological symptoms (facial paralysis and meningitis). The drug was supplied in a 5 per cent. solution or as an unmixed powder and can be given intravenously or orally in cachets ; no ill effects were observed. Intravenously 1·0 ml. was administered daily for five consecutive days, followed by a second similar course after an interval of eight days ; orally three cachets of the powder in doses of 0·2 gm. were administered for five days followed by a similar course, also after an interval of eight days. In the cases reported, one course only was given in three instances, four patients being treated intravenously and three by the oral route. The author considers that, given by mouth in a first attack, S.T.B. is effective but in cases with neurological complications the results are not so good. Six of these patients gave positive findings on examination of a thick blood smear.

[The results appear encouraging but the series is too small to enable a definite opinion to be formed. No mention is made as to where the drug can be obtained.] *C. F. Shelton*

LEPROSY

GHOSH, L. M. **Diseases simulating Leprosy.** *Leprosy in India.* 1949, July, v. 21, No. 3, 131–5.

This is a useful clinical description of the diseases liable to be mistaken for leprosy. The most important are the leishmania infections, but oriental sore due to *L. tropica* is found almost entirely in the northerly two-thirds of the western half of India and kala azar (of which the dermal lesions are relevant) in the remainder of the country. Microscopical examinations of material obtained by puncturing the skin lesions are necessary for their differentiation. Post-kala-azar dermal leishmaniasis is much the more important of the two in this connexion because, in addition to the typical dermal nodules, it also occurs in its early stages as small hypopigmented patches on the face, neck and inner sides of the arms and thighs. The patches may coalesce as raised erythematous areas before the more easily recognized nodules form, which are free from lepra bacilli, and they may simulate tuberculoid leprosy. A previous history of a prolonged febrile stage, which yielded to antimony treatment, will be of importance. In dermal leishmaniases, thickened patches most frequently appear around the mouth, and begin with a characteristic flushed appearance.

Tuberculosis of the skin may also resemble tuberculoid leprosy, but in the form of lupus the apple-jelly appearance and the distribution of the lesions enable it to be recognized. The sarcoid form is more difficult to distinguish

without biopsy. Syphilides form a third simulating condition, but the red to copper colour and presence of spots on the palms of the hands and on the soles of the feet are the main distinguishing points. The author states that " blood serum examination " will distinguish the diagnosis and their response to iodides is of value. The presence of thickened nerves and some degree of anaesthesia in tuberculoid lesions of leprosy is also most helpful. Other conditions mentioned as being liable to confusion with leprosy are seborrhoea, acne rosacea and naevus in its various forms. *L. Rogers*

Singh, B. **False Positive Serological Reactions for Syphilis in Leprosy.** *Brit. J. Venereal Dis.* 1949, Sept., v. 25, No. 3, 159–60.

" Results of Wassermann and Kahn tests in sixty-four cases of leprosy have been tabulated. Kahn verification tests were performed in ten of these sixty-four cases. The quantitative titres with the serial dilutions of sera with 0·9 per cent. saline and distilled water respectively were found to be comparatively higher than those observed in sera showing false positive reactions in malaria, small-pox vaccination, and eosinophilia."

Teichmann, G. O. **A Study of Lepra Reactions.** *Leprosy Review.* 1949, July, v. 20, No. 3, 89–94.

This article deals with extensive experience at Purulia, India. During the dry hot season in May injections are reduced to a minimum. During the year about one-third of the patients showed reactions, which were slightly less in women, who show milder infections, but active lepromatous cases showed reactions in only one-third and the rest were able to work regularly and remained in good health. Of 140 reacting patients 77 had only one reaction, 35 had two and only 28 more than two. The intensity of the reactions varied widely and reactions were most frequent in the hot dry months of March to June. Such illnesses as pneumonia and dysentery were followed by severe reactions, but this was not the case with complicating tuberculosis. Nearly all those with three or more reactions had shown an early tendency to them, and hydnocarpus injections may have to be stopped in such cases. The author considers that reactions occur in both lepromatous and neural cases and are allergic in origin and not due to dissemination of lepra bacilli through the system; for the commonly seen rose nodules during reactions seldom result in permanent nodules. The swelling of nerves during reactions is due to oedema and not to cellular infiltration and an incision of the nerve capsule during reactions often causes marked relief of pain. In two major tuberculoid cases sudden reactions were accompanied by the presence of numerous bacilli, which disappeared within a few months. *L. Rogers*

Viradikarta, D. & Darwis, A. Die tuberkuloide Lepra. (Ihre klinische und therapeutische Bedeutung.) [**Tuberculoid Leprosy: Clinical and Therapeutic Features.**] *Acta Dermato-Venereologica.* Helsingfors. 1947, v. 27, No. 4, 307–33. [23 refs.]

The English summary appended to the paper is as follows:—

" Seven cases of tuberculoid leprosy are described and are recognized on clinical grounds.

" In six of these cases the tuberculoid nature is revealed by the histological picture and the routine bacteriological findings.

" All of these cases with tuberculoid manifestations were of the anaesthetic type.

"One case has been observed during a period of two years; here the tuberculoid skin lesions occurred in attacks and subsided apparently not owing to any 'specific treatment'.

"Thus, tuberculoid manifestations are not a suitable object for proving the usefulness of any curative method.

"There is a certain parallelism between the clinical aspect of the skin lesions and the histological changes. If there is an acute or subacute elevated erythematous macula, the histological picture is that of the typical tuberculoid condition, with epithelioid cells and numerous LANGHANS's giant cells. In the inactive phase the giant cells seem to disappear, and the picture is that of the ordinary anaesthetic macula.

"The classification of the tuberculoid manifestations is discussed. It is reasonable to classify them as neural, being only a variety of the neural type, because of the clinical, histological and bacteriological findings."

SMITH, M. **A Pharmacological Study of Three Sulphones.** *Leprosy Review.* 1949, July, v. 20, No. 3, 78–88, 7 figs.

This is an important study of the absorption, distribution and excretion of sulphetrone, diasone and the non-proprietary and much cheaper active principle of the sulphones, diaminodiphenylsulphone (DADPS). A large number of analyses were made of faeces, urine and blood, in this work. The most desirable sulphone is the least toxic with complete absorption from the bowel and slow excretion in the urine, so that effective blood concentration is obtained on small widely spaced doses. Cases under treatment for a month or over were used. Twenty-four-hour stools for three days showed, under different doses, mean rates of unabsorbed DADPS of 4 per cent., of diasone 46 per cent. and of sulphetrone 85 per cent.; the first, therefore, is the only one to show very nearly complete absorption. After injection into muscles 5 per cent. to 10 per cent. of sulphetrone was excreted in the faeces and 89 per cent. in urine; after oral administration 11 per cent. was excreted in the urine, against 53 per cent. diasone and 83 per cent. DADPS. Thus, diaminodiphenylsulphone is extremely well absorbed and is excreted slowly in the urine, it has therefore great advantages for oral administration. The author suggests that parenteral administration of sulphetrone would be more economical than oral administration. *L. Rogers*

CHOWDHURI, B. N. & MUKERJI, B. **Chemotherapy of Leprosy and Tuberculosis with Sulphones.** *Calcutta Med. J.* 1949, June, v. 46, No. 6, 179–93. [77 refs.]

A critical review.

LEPROSY IN INDIA. 1949, July, v. 21, No. 3, 165–70. **Report of the Leprosy Research Department, School of Tropical Medicine, Calcutta, for 1948.**

This report deals with sulphone treatment of leprosy in patients in the Gobra Leprosy Hospital. Most of the patients were in an advanced lepromatous stage with bacteria present. Diasone and sulphetrone marked a great advance in the treatment of such cases with certain limitations, for clinical improvement was far more evident than reduction of lepra bacilli. The chief points of interest are that a small number of patients were unable to stand an adequate dose and that in a few cases enlarged caseating glands improved greatly. Only one of 12 patients under diasone became negative bacteriologically. Under

sulphetrone, only one of 28 became free from bacteria in one to two years. Injections of the drugs present advantages, which are being investigated, as the cost of oral use is very high for India. *L. Rogers*

Macdonald, A. B. **Treatment with Diasone—Twelve Months' Experience with 22 Patients—an Interim Report.** *Leprosy Review.* 1949, July, v. 20, No. 3, 68–77.

In 12 months' treatment of 22 lepromatous cases of leprosy with diasone six showed marked improvement, six moderate and nine slight progress, one was slightly worse, although many of them were advanced cases, which after 15 to 20 years of chaulmoogra treatment were regarded as incurable. In almost every case ulcers healed and the health improved, so the results are considered to be encouraging. Short notes of the cases are given. *L. Rogers*

Caldeira, R. da Gloria. Contribuição à terapêutica do mal perfurante plantar. Tratamento pela leprolina "Souza-Araujo" em injeções intra-ulcerosas. [**Treatment of Leprotic Perforating Ulcers with Souza-Araujo's Leprolins.**] *Mem. Inst. Oswaldo Cruz.* 1948, June, v. 46, No. 2, 315–53, 40 figs. English summary (10 lines).

In 1943 Professor de Souza-Araujo made cultures of acid-fast organisms obtained from leprous material, and from them prepared antigens which he called leprolins [see this *Bulletin*, 1945, v. 42, 132, 133, 1010, 1011]. He has used these antigens in many cases of perforating leprotic ulcers of the sole, injecting the material intramuscularly at the site of the ulcer, starting usually with 0·25 cc. (occasionally 0·1 cc.) and increasing every 2–4 days to a maximum of 2 cc. Brief details are given of 50 patients thus treated ; many showed no untoward reactions, but in some the injection was followed by fever, malaise, headache and shivering. Secretion from the ulcer diminished in three or four days and improvement was visible in a week or so, and in about two months cicatrization was complete in 46 of the 50. The total amounts injected were 0·12 cc. minimum (the patient showed signs of intolerance after this first dose, so no more was given, but the ulcer cicatrized) and 39·35 cc. maximum. No other treatment was undertaken at the same time, the ulcer being merely covered with a gauze dressing. The conditions before and after treatment are well shown in a series of photographs. *H. Harold Scott*

Teichmann, G. O. **Prevention of Deformities in Leprosy.** *Leprosy in India.* 1949, July, v. 21, No. 3, 135–9.

The author describes his experience at the Purulia leprosarium in Bengal, where efforts have long been made to mitigate these deformities. Leprosy patients of all types in time develop anaesthesia of the extremities and become liable to burns and injuries with increasing deformities. Protective gloves when patients are cooking or handling hot things and sandals for the feet are advised, leather ones being much preferable to those of rubber. Toilet of hands and feet followed by rubbing in oil to make them supple are important. Work by the patients in the fields and other forms of outdoor exercise prevent reactions and deformities. A well-balanced diet including sufficient vitamins A and D are helpful. The specific causes of deformities are pressure on nerve fibres by nodules, etc. They are most frequent in tuberculoid forms and often come under care too late for cure, although remedial exercises to strengthen the remaining muscles will be of use. When nodules can be felt on such nerves as the ulnar decapsulation of the thickened part of the nerve should be done

with the removal of caseous material usually under local anaesthesia, with finger exercises after a period of rest. In lepromatous cases, inflammatory pressure requires rest in bed with splints, and local applications with aspirin orally are useful and later capsulotomy of a nerve may be required.

L. Rogers

CARPENTER, C. M., STOKINGER, H. E., SUHRLAND, L. G. & ACKERMAN, Helen. **Chemotherapy of Murine Leprosy.** *Amer. Rev. Tuberculosis.* 1949, Sept., v. 60, No. 3, 359–65, 1 fig.

"1. The therapeutic efficacy of Promin, Diasone, and penicillin in early murine leprosy has been compared, employing dosages approximating those used in the treatment of leprosy in man. Streptomycin was evaluated in advanced murine leprosy only.

"2. Approximately 50 mg. of Promin, administered daily with the diet, suppressed the infection in rats and increased their longevity compared to that of untreated controls, but failed to effect a cure.

"3. Streptomycin, employing daily dosages of 25,000, 50,000, and 100,000 γ per Kg. of body weight, administered subcutaneously every eight hours for five days, had minimal therapeutic effects on advanced murine leprosy.

"4. Neither Diasone, 0·5 Gm. per Kg. of body weight, nor aqueous sodium penicillin, 1,000 units injected subcutaneously daily for five months, altered significantly the course of the disease."

HELMINTHIASIS

See also p. 36. SAUTET, ASSEO & CAMI, **Influence de l'alimentation de disette sur le parasitisme intestinal à Marseille (1945).**

POINDEXTER, H. A. **A Laboratory Epidemiological Study of certain Infectious Diseases in Liberia.** *Amer. J. Trop. Med.* 1949, July, v. 29, No. 4, 435–42, 1 map.

As part of the U.S. Public Health Service project in Liberia, a clinical laboratory survey of the major infectious diseases of five sections of Liberia was done during the year of 1947 and the first half of 1948. A total of 8,846 persons were selected as a fair sample of clinic admissions and were given routine stool, urine and blood examinations and some special tests.

In all areas intestinal helminthiasis ranked highest in relative prevalence. Other important infections were amoebic and bacillary dysentery, yaws and syphilis, and malaria.

Of the intestinal helminths, hookworm and *Ascaris* were the most important. *Trichuris trichiura* was also common, but *Enterobius*, *Strongyloides* and *Taenia saginata* were only rarely encountered. In one series, 73 per cent. showed hookworms and 44 per cent. *Ascaris* at a single stool examination.

Entamoeba histolytica was a common finding; the percentage findings reported varied from five to 39, the last figure being among a group of leprosy patients who also showed the high helminth infections quoted above.

Schistosoma haematobium was found in 16 per cent. of urines in one series and in nine in another.

Schistosoma mansoni was rare and usually an isolated finding.

Of external infections the commonest was tinea versicolor (34 per cent.) in the one series detailed, *Sarcoptes scabiei* (25), the *Trichophyton* group (15),

and external meatitis (15). Eczemas were less common (4 per cent.). No other skin infection was reported in more than 2 per cent. of cases.

One case of *Rhinosporidium seeberi* infection was encountered.

Malaria was apparently common and 90 per cent. of this was due to *Plasmodium falciparum*. The percentages given vary from 2 to 33 [but it is not clear what these figures signify]. Trypanosomiasis was common (19 per cent.) in the Ganta area but not elsewhere.

Filariasis (*Wuchereria bancrofti*) was given as less than 1 per cent. except in Tchien district where it was 3 per cent. *L. E. Napier*

Ortega Canet, F. Indice de infestación por parasitismo enteral en la ciudad de Santiago de Cuba. [**Intestinal Parasitism in Santiago de Cuba.**] *Rev. Méd.-Quirurg. de Oriente.* 1948, Sept., v. 9, No. 3, 167–76.

This is an account of an investigation carried out to implement instructions from the Minister of Health to combat intestinal parasitism in the Provinces of Oriente and Camagüey. The scheme comprised estimation of the degree of parasitism among the people, treatment of the infected, sanitation and erection of latrines, and propaganda.

For estimation of the parasitic index it was proposed to examine the faeces of at least 5 per cent. of the total population. At the last census, in 1943, the population of the ten Wards numbered 120,577 and of these 6,137, or a little over 5 per cent., were examined: 3,816 were positive for parasites (62·1 per cent.); 301 (4·9) with hookworms, 603 (9·08) with *Ascaris* and 2,478 (40·3) with *Trichuris*; *Giardia intestinalis* 420 (6·8), *Entamoeba coli* 360 (5·8), *Endolimax nana* 251 (4·0), *Chilomastix mesnili* 229 (3·7). [*E. histolytica* is not mentioned.] The distribution among the sexes was nearly the same. Among 3,284 males, 2,059 (62·6) were positive; among 2,853 females 1,757 (61·5). Those of the white races were most infected, *viz.*, 76·9 per cent.; among the half-castes 68·6, negroes 50 and yellow races only 4·7 per cent. There was no great difference among the age-groups affected: Of 1,631 under 4 years of age, 1,160 were positive (69·2); of 1,595 between 5 and 9 years, 1,131 (70·9); between 10 and 19 years 833 out of 1,294 (64·3) and of 1,079 between 20 and 49 years 608 (56·3); above this age positives were few, only 71 out of 524 examined (13·5).

Treatment was on the usual lines; the drugs mentioned are vermifuges, carbarsone, gentian violet, and atebrin [mepacrine], but no results are stated.

Two hundred and eighty-eight latrines were provided for dwellings without sanitary arrangements or in which these were in a bad state. Propaganda included radio-transmission and films demonstrating the risks of infection. This is to be joined up with instruction by health visitors, nurses and those engaged in giving social assistance. *H. Harold Scott*

Cardoso, F. A. & de Carvalho, P. E. Incidência de verminoses entre os matriculados no centro de saude do Instituto de Higiene de São Paulo. (Apresentação estatística dos resultados de 10,000 exames de fezes.) [**Incidence of Helminthiasis among 10,000 Persons registered at the Health Centre of the Institute of Hygiene of São Paulo.**] *Bol. Inst. Hig. de São Paulo.* 1944, No. 82, 47 pp., 18 graphs.

The English summary appended to the paper is as follows:—

"The authors present the results of the stool examinations of 10,000 persons registered at the Health Center of the Institute of Hygiene of São Paulo. They make first some considerations on the composition of the population under study. Next they give the total frequency of helminthiasis found: the

percentage of infestation in the whole group was 62·03. The percentages found for each worm were : *Trichuris trichiura*, 37·06 ; *Ascaris lumbricoides*, 32·67 ; *Necator americanus*, 16·38 ; *Strongyloides stercoralis*, 4·79 ; *Hymenolepis nana*, 4·11, and other less frequent. Finally, the authors study the distribution of the helminthiasis in general in relation to age, sex, profession, race and nationality, and present also the frequency of each helminthiasis in relation to age."

CHARLEWOOD, G. P., SHIPPEL, S. & RENTON, H. **Schistosomiasis in Gynaecology.** *J. Obstetrics & Gynaecol. Brit. Empire.* 1949, June, v. 56, No. 3, 367–85, 21 figs. on 7 pls. [21 refs.]

Although gynaecological complications of *Schistosoma haematobium* are commonly detected in clinics at Johannesburg and Durban, many must be missed in South Africa because of ignorance of the disease. Bilharzial appendicitis is an even more common extra-urinary complication than gynaecological involvement, 199 specimens of this condition being seen at the S. African Institute of Medical Research between 1911 and 1948. From a study of 33 case records and histological material from 66 other cases it appears that all the female pelvic organs are commonly involved ; although there may appear to be an infestation of only a single organ, digestion of tissues will reveal the presence of ova elsewhere even when ordinary histological examination fails to do so. Generalized bilharzial pelvic involvement clinically simulates any widespread chronic pelvic infection ; chronic lower abdominal pain, especially in the right iliac fossa, which is present on movement but absent when the patient is recumbent, is characteristic and menorrhagia is usual though there may temporarily be an early amenorrhoea. Histo-pathological studies of female pelvic organs show that in some cases there is only very slight tissue reaction to the infestation, but in others there is a vigorous response out of all proportion to the number of ova found locally in the tissues. The type of reaction, as well as its degree, varies in the same tissue, whether columnar or squamous epithelial or mesenchymal, from one patient to another. In the Fallopian tubes it was noticed that the lesions were limited to the walls and there was no mucosal reaction ; there was an interstitial salpingitis with markedly thickened walls but a patent lumen. On the other hand in such structures as the cervix, vagina and vulva the pathological response was greatest in the squamous epithelial covering and it was less evident in the underlying tissues ; in these organs the lesions resemble a carcinoma, and are in fact pre-malignant. Infestation of the endometrium is very rare, and when it occurs it is liable to be mistaken for tuberculous endometritis.

[This paper contains details of illustrative cases and much information of purely gynaecological importance ; it should be consulted in the original by those interested. See also GELFAND, this *Bulletin*, 1949, v. 46, 644.]

A. R. D. Adams

KIKUTH, W. & GÖNNERT, R. Experimentelle Untersuchungen und Erfahrungen mit dem neuen Schistosomiasismittel Miracil. [**Investigations and Experience with Miracil, the New Drug against Schistosomiasis.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1949, Aug., v. 1, No. 2, 234–58. [Numerous refs.]

The first workers to undertake systematic laboratory experiments on the chemotherapy of schistosomiasis were KIKUTH and GÖNNERT, beginning in 1932. This work eventually led to the discovery of miracil, which has been described in various post-war reports, and which has been the subject of

extensive clinical trials in Southern Rhodesia and in Egypt [this *Bulletin*, 1949, v. 46, 753 ; *ibid.*, 947]. In the present paper, the discoverers of miracil (who have been previously handicapped in giving an adequate publication about their own work) describe their technique for testing new compounds on mice and monkeys infected with *S. mansoni*, together with the main facts about their discovery of miracil. Much of this has already appeared in the previous paper by KIKUTH and GONNERT, 1948 [this *Bulletin*, 1949, v. 46, 481]. But the present paper forms a valuable review of available information about miracil and it should be consulted in the original by those interested in this subject.

F. Hawking

WATTS, Nellie P. **Prophylactic Use of Schistosomal Antigen.** *J. Immunology*. 1949, June, v. 62, No. 2, 183–92. [31 refs.]

The author briefly reviews the literature on the effects of artificially-produced immunity to infection with *Schistosoma japonicum*, *S. spindale* and "liver flukes" and on the lytic action of the sera of man, the rat, guineapig, herring gull, water snake, green frog and bullhead fish on various species of cercariae ; the sera of the cat and rabbit lack this property. She then describes her own experiments with antigens prepared from *Schistosoma mansoni*.

This species was obtained by perfusing the mesenteric veins and livers of infected rabbits with a saline-citrate solution. A total of 4,400 trematodes of both sexes, with a combined dry weight of 105 mgm., was thus obtained. The worms were washed four times in 0·9 per cent. salt solution and once in sterile distilled water and then were frozen and dried over $CaCl_2$ *in vacuo*. They were then weighed, pulverized and suspended in 0·9 per cent. NaCl solution containing 0·3 per cent. phenol, at a strength of one part of trematode substance to 100 parts of total volume. This suspension was incubated at 37°C. for one hour, left at room temperature overnight and then centrifuged. The supernatant fluid was used as a stock solution (1 : 100) and a dilution of 1 : 10 was made with 0·9 per cent. salt solution immediately before injection into the mice used.

A preliminary experiment with female mice only showed no significant differences between the immunized and control mice. In 1946, for a second experiment, 150 mice of both sexes were used. The average weight of the females was 20 gm. and that of the males 19·9 gm. and the sexes were "evenly divided". To 78 of the mice 0·1 ml. of 1 : 1,000 antigen was given intracutaneously, once a week for five consecutive weeks. One of the 72 controls died. One week after the fifth injection of antigen all the mice were given 10 cercariae intraperitoneally. Four weighings showed no material difference in the weight gains of the two groups. During the period of infection nine mice died in each group, but there was no striking difference in the death-records of the two groups.

During the eleventh week miracidia were hatched from the faeces and this method showed that 11 per cent. of the surviving mice in the antigen-treated group and 16 per cent. in those of the control group were infected. It was evident, however, that this method failed to reveal many infections, because autopsies done during the twelfth to the sixteenth week showed that 42 per cent. of the antigen-treated mice and 63 per cent. of the controls were infected. During these autopsies the worms were harvested by perfusion with saline-citrate. The mesenteries and livers were teased apart and the crushed livers were examined for eggs of the worms, which were always found in the mottled livers with small abscesses, never in livers that looked normal. These autopsies showed, in the antigen-treated group of 69 surviving mice, 49 worms (21 males, 12 females and 16 immature) and in the control group of 62 surviving mice 81 worms (38 males, 22 females and 21 immature).

The authors conclude that the treatment with antigen reduced the total number of worms to about one-half the number found in the untreated controls. The result is considered to be statistically significant. Antigen treatment did not appear to affect the distribution of the worms, because 57 per cent. of them were found in the mesenteries in the immunized mice and 62 per cent. in the same situation in the controls. There was no evidence that the antigen had a marked effect on the rate of development of the trematodes, nor that one sex was more susceptible than the other.

The *S. mansoni* antigen used at the same dilution gave a positive intradermal test with three human beings infected with *S. japonicum* and with one infected with *S. mansoni* and rabbits infected with *S. mansoni* gave a gradually increasing response to this skin test. *G. Lapage*

VON BRAND, T., MEHLMAN, B. & NOLAN, M. O. **Influence of some Potential Molluscacides on the Oxygen Consumption of** *Australorbis glabratus*. *J. Parasitology*. 1949, Oct., v. 35, No. 5, 475–81, 1 fig.

"1. Seventy-two compounds, many of them potential molluscacides, have been tested as to their inhibitory effect on the oxygen consumption of *Australorbis glabratus*.

"2. Four types of reaction could be distinguished: 1. No effect, 2. transitory inhibition, 3. slow inhibition, and 4. rapid and lasting inhibition.

"3. Due to difficulties inherent in the animal material the mode of action of the compounds could not be ascertained with certainty. Some indications exist, however, that enzyme inhibition is involved in reaction types 3 and 4.

"4. The most effective inhibitor found was α-nitrostilbine which inhibited the oxygen consumption by more than 99 percent."

CORRECTION

In the paper by SZIDAT [this *Bulletin*, 1944, v. 41, 57], the sentence in para. 3, line 8, beginning "They differ . . ." should read "They differ from *Cercaria ocellata*, La Valette, in that the latter does not attach itself to the substratum with its ventral sucker, but remains suspended in the water; while the three new species [*C. neocellata*, *C. parocellata*, and *C. pseudocellata*] do attach to the substratum by the acetabulum."

EDELMAN, M. H. & SPINGARN, C. L. **Clonorchiasis in the United States. Report of Four Cases.** *J. Amer. Med. Ass.* 1949, Aug. 6, v. 140, No. 14, 1147–50. [Refs. in footnotes.]

The authors report the finding of the eggs of *Clonorchis sinensis* in the stools of four Caucasians living in New York city. They had all recently lived in Shanghai for several years.

Three patients, adults, had symptoms referable to the upper portion of the digestive tract, epigastric pain, distention and right upper quadrant tenderness, and the fourth, a child aged four, had no gastro-intestinal symptoms, but had attended hospital for certain ill-defined nervous symptoms, probably unconnected with the fluke infection. In one patient there were also unexplained bouts of low fever, and others had loss of appetite, loss of weight, diarrhoea, and constipation.

Treatment was by methylrosaniline, 60–120 mgm. thrice daily in enteric-coated capsules for two to four weeks. There was clinical improvement, reduction of eosinophilia, and temporary disappearance of eggs from the stools, but

in no case apparently was a definite cure established. In one case chloroquine diphosphate was given, 0·5 gramme a day for four weeks without evident effect.

The paper includes a brief résumé of the clinical and epidemiological features of this infection. *L. E. Napier*

Basnuevo, J. G. & Blanco Rabassa, E. Hymenolepiasis nana y cloroquina. [*Hymenolepis nana* **Infection and Chloroquine.**] *Rev. Kuba Med. Trop. y Parasit.* 1949, May–June, v. 5, Nos. 5/6, 82.

The English summary appended to the paper is as follows :—

" The authors report four cases of Hymenolepiasis by *Hymenolepis nana* treated with Chloroquine (Tanakán).

" Two cases apparently are cured ; the other two presented again eggs of *Hymenolepis nana* in their stools two weeks after the treatment. (No cured cases)."

Jenkins, J. A. **Hydatid Disease.** *Post Graduate Med. J.* 1949, Mar., v. 25, No. 281, 107–24, 16 figs. on 4 pls.

A discussion with an account of 16 cases.

Abdine, F. **A Case of Extensive Hydatid Disease of the Liver, associated with Bilharzial Hepato-Splenomegalic Syndrome and Pulmonary and Urinary Bilharziasis.** *J. Roy. Egyptian Med. Ass.* 1949, Aug., v. 32, No. 8, 628–33, 4 figs.

Ferro-Luzzi, G. Ulteriori indagini sull'anchilostomiasi in Eritrea. [**Study of Ancylostomiasis in Eritrea.**] *Boll. Soc. Ital. di Med. e Igiene Trop.* (Sez. Eritrea). 1949, v. 9, No. 2, 130–33.

The English summary appended to the paper is as follows :—

"Ancylostomiasis, which for the first time was found in Eritrea in 1944 as a very uncommon infestation, is recently reaching a large distribution amongst the natives of the Eritrean highlands. This disease is nowadays responsible for a progressive and evident increase of the hospitalisations.

" Prophylactic measures, as already suggested by the author since 1944, are now more urgently required.

" As to the genus responsible for the infection, the investigations performed by the author on 41 patients, showed that in the natives of the Eritrean highlands *Necator americanus* is prevalent. Genus *Ancylostoma duodenale*, which occurred in 2 cases in 1944, has been no more encountered in Eritrea."

Stransky, E. & Quintos, F. N. **On Hookworm Anemia (Aplastic Anemia in Hookworm Disease).** *Blood.* 1947, Jan., v. 2, No. 1, 63–71. [23 refs.]

Ankylostomiasis is widespread in the Philippines, and therefore the effects of this infection are an important public health matter.

The authors have observed three types or stages in the blood picture in hookworm infestation.

Type I. " Compensated Anaemia " characterized by hyperplasia of the bone marrow and eosinophilis, but no anaemia.

Type II. Hypochromic anaemia with eosinophilia and marrow hyperplasia.

Type III. Aplastic anaemia resulting from exhaustion of the bone marrow.

Examples of types II and III are given.

In severe cases of type II there is a tendency to marrow hyperplasia but there is recovery.

A type-II case, a 12-year-old boy, had 12 grammes of haemoglobin and 3·6 million red cells per cmm. As well as hookworm disease he had schistosomiasis, amoebiasis, trichuriasis and ascariasis. About this case the authors state that " as far as we could ascertain, the anaemia was not influenced by the other parasitic infections ".

In discussing their findings the authors write :—

" During the same period of time we observed five cases of so-called aplastic anaemia, compared to the eight cases associated with hookworm anaemia. The incidence of an aplastic bone marrow response in hookworm anaemia is therefore high compared to that without hookworm disease : a definite causal relationship may therefore be present."

[In no case is any indication of the hookworm load given. There is no reference to the findings of adult worms and, in the few references to the ova, the findings are given as " ++ " or " +++ ".

The first two types of blood picture in ankylostomiasis are well recognized ; the third type is not. The evidence that there was any connexion between the aplastic anaemia and the hookworm infection in the cases these authors reported was not of a very convincing nature : two examples are quoted.]

L. E. Napier

Galliard, H. & Brumpt, L. C. Ulcus duodénal ou strongyloidose méconnue. [**Duodenal Ulcer or Unrecognized Strongyloidiasis.**] Reprinted from *Semaine des Hôpitaux de Paris*. 1947, June 7, v. 23, No. 21, 1393–6.

When we realize that the adult *Strongyloides stercoralis* is imbedded deeply in the duodenal mucosa and that the larvae force a path through the tissues to gain the lumen, it is not surprising that the symptoms are often confused with those of duodenal ulcer. Two cases are cited :—

A man of 35 who had lived in Guadeloupe for ten years returned to France in 1947. He had amoebiasis in 1940 ; he had also had digestive troubles since 1940 and had been investigated in hospital. The X-ray examination suggested a duodenal ulcer. However, the symptoms continued and as the character of the pain and the gastric attacks were atypical, parasitism was suspected and the stools examined ; these showed ankylostome eggs and larvae. Appropriate treatment was given, but despite the removal of the hookworms symptoms persisted. When he was seen on his return to France no hookworm eggs or amoebic cysts were found in his stools, but the larvae of *Strongyloides stercoralis* were present, and it was thought that the earlier reports of the finding of hookworm larvae should probably have been *Strongyloides* larvae.

The second case was that of a doctor in Cochin-China. He was infected in 1934 and had his first digestive troubles in 1935. He complained of a weight in the stomach after meals, chronic constipation, spasmodic pains and hyperacidity. He lost weight. At 11 o'clock one night he had an extremely violent attack suggesting intestinal obstruction. The attack recurred next day in a less severe form and symptoms continued for three weeks. Repeated bismuth meals showed no radiological abnormality, but he found that bismuth controlled the pain : alkalis increased it. In 1941, during an attack he had diarrhoea for the first time and examination of the stools showed *Strongyloides* larvae. He treated himself with many anthelmintics, including oil of chenopodium, quinacrine [mepacrine] and gentian violet, but the symptoms continued, and the severe attacks recurred at intervals of six months and were accompanied each time by urticaria. At each attack larvae were found, but they became less and less abundant, and in 1945 none was found. The patient was now arrested by the Japanese and put in prison for two months. On his release he had beriberi, pellagra and dysentery, but the symptoms of

strongyloidiasis and the larvae had disappeared. He returned to Paris where he had a slight recurrence of abdominal symptoms : he had an eosinophilia of 17 per cent. and larvae were again found in the stools.

The authors discuss the symptomatology of strongyloidiasis. The common symptoms they have noted in Tonking are heaviness and diffuse pain in the stomach with a colicky motion in the morning, but sometimes this is more violent in character. The pain is predominantly in the region of the caecum or sigmoid ; the attacks may occur once or several times during the day and night ; their rhythm is not dependent on meals, but they may occur on an empty stomach or two hours after a meal ; they are relieved by vomiting or by passing a stool ; and they are sometimes calmed by ingestion of food or fluid, but at other times they are exacerbated. The diarrhoea occurs in attacks alternating with constipation ; it is preceded by a feeling of weight, meteorism, epigastric pain, nausea, vertigo and rarely vomiting. The attacks are accompanied by lassitude, general mental and bodily fatigue, wasting, anaemia, fever, and urticaria. Eosinophilia is constant. The radiological picture is variable, sometimes suggesting ulcer, at others not.

The authors found treatment disappointing : temporary improvement was often obtained but there was always a recurrence of the symptoms and a reappearance of the larvae. They had little success with gentian violet by whatever method they used. It is impossible to say that a patient is cured unless he is followed up for several years. *L. E. Napier*

CORRIGAN, F. L. **A Case of Pulmonary Strongyloidiasis.** *Brit. Med. J.* 1949, Oct. 1, 738–9.

An army sergeant of 51, with 32 years' service in many parts of the tropics suffered from an acute illness in April 1946. A right-sided pleural effusion was found, which was aspirated repeatedly. Clinical details are given which show that tuberculosis was suspected, but not confirmed bacteriologically. In nine months he had been in three hospitals.

When seen by the author in Harefield County Hospital in March 1947, he had a slight cough and occasional attacks of asthma. His general condition was good and there were no gastro-intestinal manifestations.

Examination showed marked wasting on the right side of the chest, diminished movement, dullness and impairment of breath sounds over the right base, together with rhonchi over both lungs. The blood picture showed 9,800 leucocytes per cmm. with 30 per cent. of eosinophiles.

Radiographically the appearance of the right lung suggested pleural effusion or residual pleural thickening and infiltration of the apex.

Because of the eosinophilia, stools were examined and numerous larvae of *Strongyloides stercoralis* were found. Attacks of asthma continued and were relieved by ephedrine hydrochloride.

A description is given of ineffective attempts to clear the clinical condition with gentian violet orally and intravenously. Hexylresorcinol (9 gm. after and followed by a saline purgative within 24 hours) resulted in the death of most of the larvae. The patient remained free from attacks of asthma for ten days, after which numerous living larvae reappeared in the stools and the asthmatic attacks reappeared.

Later, in another hospital, the larvae were reduced by treatment with gentian violet and simultaneous improvement of the asthma occurred during the period of reduction. *Strongyloides* larvae were not found in the sputum nor could tubercle bacilli be detected on concentration and culture.

The author refers to the literature on *Strongyloides* infestation involving the lungs [this *Bulletin*, 1930, v. 27, 468 ; 1944, v. 41, 951].

The relationship of the asthma to the presence of living larvae in the stools is noted, as is the fact that treatment failed to eradicate the infestation completely.

No larvae were found in the original pleural effusion, the significance of which is difficult to assess. *H. J. O'D. Burke-Gaffney*

SOMASUNDARAM, P. **A Filarial Survey of Palacole Town.** *Indian J. Med. Sci.* 1949, July, v. 3, No. 7, 421–32, 1 map, 1 graph & 10 figs. on 3 pls.

Palacole is a municipal town in a deltaic area in the West Godavari district of Madras Province, 12 miles inland from the coast of the Bay of Bengal, with about 20,000 inhabitants.

It has a protected water supply but there are 83 large *tanks*, averaging 100 yards square, in the town and an irrigation canal passes through it. These *tanks* are now only used for watering gardens and are mostly completely covered by aquatic vegetation ; *Pistia stratiotes* is the main species.

In the survey, 5,957 persons were examined and 474 (7·95 per cent.) had clinical evidence of filariasis ; of these, 250 were women (8 per cent. of those examined) and 224 were men (7·5 per cent.).

Elephantiasis of the lower limbs was found in 363 (or 76·6 per cent.) of whom 63 per cent. were females. Elephantiasis of the scrotum was found in 88 cases, and 14, or 3 per cent., had upper limb involvement. Three per cent. had filarial enlargement of the glands in the groin and 3 per cent. lymphangitis ; the lowness of these last two figures is attributed to difficulties of examination. There was a history of chyluria in one case only. The highest incidence was in the 36–40-years age group : the youngest patients were in the 10–15 group.

Slides were taken from 556 persons, mostly free from clinical signs, between 9 and 10.30 p.m. and microfilariae were found in 14·9 per cent. These were identified as *Wuchereria bancrofti*.

The adult mosquitoes captured, 1,826, were of five Anopheline species (*subpictus*, *vagus*, *annularis*, *culicifacies* and *hyrcanus*) and two culicines, *Mansonioides* and *Culex fatigans* : 51·7 per cent. were culicines.

On surface inspection the tanks appeared to be entirely free of larvae and pupae, but on investigating the vegetation *Mansonioides* larvae and pupae [species not stated] were found attached to the roots of the *Pistia*.

Dissection of mosquitoes showed that 12·4 per cent. of *Mansonioides* and 2·1 per cent. of *C. fatigans* were infected : in one of the former there was a proboscis infection. None of 185 *A. subpictus* was found infected.

L. E. Napier

GALLIARD, H., MILLE, R. & ROBINSON, W. H. La filariose a *Wuchereria bancrofti* var. *pacifica* a Tahiti et dans l'Archipel de la Société. [**Filariasis due to *Wuchereria bancrofti* var. *pacifica* at Tahiti and in the Society Archipelago.**] *Ann. Parasit. Humaine et Comparée.* 1949, v. 24, Nos. 1/2, 30–48, 2 text figs. & 10 on 3 pls. [13 refs.]

A detailed account of filariasis in Tahiti is given which will be useful for record and future reference.

The main vector of *Wuchereria bancrofti* var. *pacifica* is *Aëdes scutellaris pseudo-scutellaris*. The microfilariae did not show periodicity ; the counts at 8 a.m. and 8 p.m. are of the same order.

Of 1,095 inhabitants of the district of Paea, 916 were over five years of age ; of the latter, 280—57 per cent. of whom were males—showed microfilariae in the blood. Of the 916 older inhabitants, 179 (20 per cent.) showed clinical evidence of filariasis, of whom 81 (9 per cent.) had elephantiasis. Of 278 persons

showing microfilariae in the peripheral blood 206 were symptomless, 47 had lymphangitis, and 25 elephantiasis. In addition, 51 persons without microfilariae in the blood had lymphangitis and 56 elephantiasis. (That is, 47 per cent. of 98 persons with lymphangitis showed blood microfilariae compared with 31 per cent. of 81 persons with elephantiasis and 28 per cent. of 737 persons without clinical evidence of filariasis.)

The incidences of microfilaraemia, lymphangitis and elephantiasis were each slightly higher in males than in females. The relation between the incidences of elephantiasis, lymphangitis and microfilaraemia, respectively, does not vary in the different age groups. [As the population of the age groups is not given the actual incidence in each group cannot be calculated.]

The anatomical distribution of the elephantoid lesion in 83 cases is recorded ; one leg was affected in 22, both legs in 17, one arm in seven, the genitals in nine, the genitals and one leg in six, and other combinations in the remaining 22 cases. The ages of the patients were from 17 to 77 years, but the largest number of patients were between the ages of 45 and 55. If the first onset of elephantiasis was considered, 23 or 27 per cent. fell in the age group 20 years and under.

The three common mosquito carriers were *Aëdes scutellaris pseudo-scutellaris*, *Aëdes aegypti* and *Culex quinquefasciatus* [*fatigans*] ; more rare were *Culex annulirostris* and *Culex sitiens*. Of the first-named 50 per cent. have been found infected. *Culex quinquefasciatus* probably played no rôle in transmission, though it is abundant.

The children in schools in different parts of Tahiti were examined ; the microfilaria incidence varied from 12 to 20 per cent. The incidence was usually higher in the older children (10–15 years) as compared with the incidence in the younger age groups (5–10 years), but there was one exception. The incidence among two groups of colonial troops was 31·5 and 30 per cent.

There were more cases of clinical filariasis and more carriers of microfilariae in the congested quarters, and white persons were as frequently infected as the indigenous population.

The geographical conditions, the mode of life of the people and the abundance and extreme receptiveness of the mosquito vectors explains the hyperendemicity of filariasis in Tahiti and the neighbouring islands. *L. E. Napier*

Rodhain, J. Considérations sur le rôle des microfilaires dans la pathogénie des filarioses. [**Observations on the Rôle of Microfilariae in the Pathogenesis of Filariasis.**] *Ann. Soc. Belge de Méd. Trop.* 1949, June 30, v. 29, No. 2, 177–90. [20 refs.]

The recent advances in the chemotherapy of the filariases have shed fresh light on the pathogenesis of these infections. Ten years ago the author remarked that the presence in the blood of living microfilariae, whether sheathed or unsheathed, even in enormous numbers does not cause obvious manifestations. Though many of these larvae must die daily, and are broken down and absorbed, neither the dead larvae nor the products of their disintegration cause any obvious general reaction. Local changes associated with the disposal of the dead embryos might be expected in tissues rich in reticulo-endothelium, but these so far have not been exactly defined. Most workers believe it is the death and disintegration in the lymphatic vessels of the adult worms that cause the gross manifestations of filariasis. Though O'Connor and also Lane [this *Bulletin*, 1932, v. 29, 766 ; 1948, v. 45, 802] have described lesions due to dead microfilariae these were found only in the immediate vicinity of adult worms, and they were not found elsewhere. Hartz [this *Bulletin*, 1944, v. 41, 955] has described lesions in lymph glands containing living or dead adult worms,

which he ascribed both to dead and to living microfilariae ; these were attributable to the stagnation of the microfilariae in lymph channels obstructed by dead adult worms.

The normal location of the unsheathed microfilariae of *Onchocerca volvulus* is dense connective tissue, through which they move in the lymphatic spaces ; they are also commonly seen in lymphatic glands, especially those draining the area where there are onchocercal nodules. The duration of their stay at a given point, in this case in the skin, is much greater than is that of the blood-borne microfilariae, so it is not surprising that in skin containing them there is histological evidence of local irritation ; these larvae for the same reason cause changes in the eyes, and doubtless the considerable tissue hyperplasia seen in hypertrophied lymph glands with adenolymphocoele is in part due to their presence. Whether the changes in the skin, the eyes, or the glands are directly due to the mechanical presence of the parasites or to sensitization to them of the tissues is not clear.

Bruynoghe [this *Bulletin*, 1940, v. 37, 657] injected large numbers of microfilariae of *Dirofilaria immitis* into rabbits, guineapigs, and puppies without producing circulating antibodies to them, as judged by precipitin and complement deviation tests ; in the puppies there was slight skin sensitization. He found, when using an aqueous extract of these microfilariae as antigen, that a positive complement deviation test was obtained with the sera from patients infected with *Loa loa*. This suggests that man reacts more sensitively than animals to a microfilarial antigen.

In human onchocerciasis it seems that the presence of the adult worms causes sensitization, and so reactions to the microfilariae are evident away from the immediate locality of the adult worms, which is not the case in *Wuchereria bancrofti* infestations. These reactions take the form of perivascular infiltration in the skin, in the various parts of the eye, and in the lymph glands. Though the ocular lesions occur only when the nodules containing adult worms are located on the head, and crural or inguinal lymph gland lesions when they are around the pelvis, the skin lesions are more generalized and more remote from the adult worms.

Hetrazan is an effective microfilaricide ; in suitable dosage it frees the skin of the embryos of *O. volvulus* in 48 hours, and frees the blood of those of *W. bancrofti* within a similar period ; it is slightly less rapid in action against the embryos of *Loa, loa*. While destroying Bancroftian microfilariae, treatment with it was shown by Santiago-Stevenson, Oliver-Gonzales and Hewitt [this *Bulletin*, 1948, v. 45, 353] to precipitate anaphylactic reactions which appeared on the second day of treatment, when the microfilarial destruction was greatest and before the adult worms were destroyed. The reactions could be modified by giving an anti-histamine drug. Severe reactions similarly occur when cases of onchocerciasis are treated with this drug, and these again are due to the rapid destruction of large numbers of microfilariae ; the adult worms in this particular infection may survive Hetrazan treatment. In cases of loiasis, similar, though less severe, reactions also occur during treatment with Hetrazan. Antrypol was shown to be curative in onchocerciasis by van Hoof, Henrard, Peel and Wanson [this *Bulletin*, 1948, v. 45, 456], but it also causes severe reactions coincidentally with massive destruction of the microfilariae.

Fouadin eradicates *Dirofilaria immitis* infestations of dogs ; the microfilariae disappear slowly after the adult worms are killed, and there are no anaphylactic reactions as a result of the treatment. Culbertson [this *Bulletin*, 1944, v. 41, 772 ; and 1946, v. 43, 763] found certain antimonials to cure the filariasis of cotton rats ; he showed these and an arsenical, Melarsen oxide, to be curative in human *W. bancrofti* infections. All these drugs destroy the adult worms but not the microfilariae ; they cause no general reaction, though

localized nodules form around the killed adult worms. A new trivalent arsenical, Arsenamide, has been shown by Otto and Maren (*Ann. New York Acad. Sci.*, 1948, v. 50, 51) to cure the filariases of cotton rats, dogs and man ; this compound does not kill microfilariae quickly, and although there may be lymphangitis and lymphadenitis there are no severe general reactions attending its use. Hetrazan does not affect microfilariae of *Acanthocheilonema perstans*, and treatment with it of this infection causes no reaction.

It is thus evident that the sudden mass destruction of microfilariae results in a general anaphylactic reaction, which may be very severe and even fatal. The slow destruction of microfilariae, associated either with destruction of the adult worms or with damage to them and temporary suspension of embryo production, does not cause a generalized reaction ; indeed it may result in some desensitization of the patient. The destruction of adult worms causes nothing more than a local reaction around the dead worms. It seems, therefore, that microfilariae have antigenic potency, and while they are alive this is minimal ; when they die in small numbers it is restricted and insufficient to produce general reaction ; but when large numbers of microfilariae are suddenly killed there is a general reaction proportional to the sensitivity of the patient.

That the destruction of adult worms by drug treatment causes nothing more than minor localized lesions may be explained in part by desensitization of the body by previous reactions to the microfilariae ; if a drug were available rapidly to destroy adult worms, without affecting the microfilariae, there probably would be as violent a reaction as results from mass microfilarial destruction. *A. R. D. Adams*

Kouwenaar, W. Tropische eosinophilie door besmetting met filaria. [**Tropical Eosinophilia due to Filarial Infection.**] Reprinted from *Geneesk. Gids.* 1948, June 17, 2 pp.

As two Dutch cases have come to his notice recently, the author reports a syndrome which has been found to be not uncommon in Java, Sumatra and Curaçao. It consists of a marked eosinophilia associated with unexplained swelling of the lymphatic glands, usually in the groin but sometimes in the axilla. Section of an excised gland shows striking eosinophil infiltration often with abscess formation, and within these abscesses microfilariae have been found which have been identified as those of *Wuchereria malayi*.

These patients do not show the generally accepted signs of filariasis. Microfilariae are practically never found in the peripheral blood, nor is recurrent lymphangitis, elephantiasis or chyluria seen. Patients have been observed up to six years after diagnosis ; the eosinophilia has persisted, only one patient on one occasion has shown microfilariae in the peripheral blood, no other generally accepted signs of filariasis have developed and in no case have sections of mature filariae been seen in an excised gland.

Further investigation has shown, however, that the effect of the infection is more widespread than the symptoms lead one to expect. There is usually a raised erythrocyte sedimentation rate, the Takata and Mancke-Sommer reactions are sometimes positive [the latter is not described], the albumin-globulin ratio of the serum is altered and in some cases more or less transient pulmonary infiltrations have been seen. Haemorrhagic nephritis has also been seen in four Javanese.

This condition, once recognized, is found to be not uncommon in Indonesia, even in areas where filariasis is not considered endemic. It is usually not seen in Europeans in the East, but the conditions of Japanese prison camps were such that some have apparently contracted the infection. Physicians in Europe should therefore be on the alert for it. *A. L. Winner*

Halawani, A., Baz, I. & Dawood, M. **A Preliminary Report on the Treatment of Ambulant Cases of Bancroftian Filariasis with Hetrazan in Egypt.** *J. Roy. Egyptian Med. Ass.* 1949, May, v. 32, No. 5, 395–403.

Seventeen ambulant patients were treated with Hetrazan in doses of 0·9–2 mgm. per kgm. three times daily for 10–23 days. All had microfilariae of *W. bancrofti* in the blood and most had hydroceles or other signs of filariasis. The drug was well tolerated (except in one case in which general weakness and malaise were severe). But general weakness, malaise, pain and swelling of the testes, gastro-intestinal symptoms, headache, pain in loins or joints, etc., occurred in many of the patients. They usually happened during the second and third days, and disappeared again although the treatment was continued ; they were brought on again by exertion. The leucocyte count often rose. In all cases the microfilariae count was greatly reduced, although many of the patients continued to show small numbers of microfilariae. Five of the sixteen cases (*i.e.*, 31 per cent.), which were followed for six months, remained negative during the last three months. *F. Hawking*

Davis, T. R. A. **Filariasis Control in the Cook Islands.** *New Zealand Med. J.* 1949, Aug., v. 48, No. 266, 362–70. [13 refs.]

The vector of filariasis in the Cook Islands of the Pacific Ocean (20°S., 158°W.) is *Aëdes pseudoscutellaris* (Theobald), a very common mosquito. The less common *Culex fatigans* and *Culex annulirostris* are not vectors. The parasite is *Wuchereria bancrofti*. The methods of mosquito control are directed against the breeding places, but funds provided by the New Zealand Government are on an annual maintenance basis and are insufficient for any attempt at total eradication of the vector.

The breeding places of *Aëdes pseudoscutellaris* are holes in trees such as flamboyant and hibiscus and all manner of small containers of water including tins, discarded coconut shells, roof gutters, etc. ; in addition to tree holes any plant or hedge which is capable of holding small quantities of water for the requisite breeding period is suspect.

Houses are not used as resting places by the adult mosquitoes, preference being shown for damp places shaded by densely foliaged bushes in the immediate neighbourhood of breeding places. In particular unkempt hedges such as the popular jasmine bushes in gardens invariably harbour these mosquitoes. Flight range is short with a probable maximum of 150 yards and is very much decreased when the mosquito is sick owing to the presence in its body of developing filarial larvae. Density of mosquito population is related to adequacy of rainfall to fill containers efficiently. Biting times are from dawn till 8 a.m. and from 4 p.m. to dusk.

The clinical incidence of filariasis varies between 60 and 90 per cent. of the population ; the condition causes a serious loss of working hours sufficient to interfere with the commercial economy. No efficient drug for prophylaxis, suppression or cure exists, though the action of Hetrazan is encouraging. Personal protection is possible by the use of repellents, but the local people will not be bothered with these.

Control measures within the financial limitations were directed at breeding and resting places of the mosquito in and around villages. An effective garbage removal and disposal service was instituted ; tree holes were filled or drained. Householders were taught to trim their hedges to let in light and wind and to train creepers, etc., on to trellis work well above the ground. To displace long grass and undergrowth in the vicinity of dwellings, the people were encouraged to plant kumera, dry taro and arrowroot, none of which was

suitable as breeding or resting places. Swamp-breeding mosquitoes (non-vectors) were controlled by the introduction of larva-eating fish, *Gambusia affinis*. Once an effective organization was developed and the confidence and co-operation of people attained legislation to cover the measures was introduced. Although a microfilaria survey has not yet been possible, in 1948 it was difficult to find specimens of *Aëdes pseudoscutellaris*.

[This paper is a useful reminder in these days of powerful and expensive insecticides that the older simple hygiene measures can be most effective, if properly organized, and may clear the path for a rapid eradication campaign.]

R. Ford Tredre

Wanson, M. & Peel, E. Note sur le développement partiel d'*Acanthocheilonema perstans* Manson chez divers culicides africains. [**Partial Development of *Acanthocheilonema perstans* in Different African Culicidae.**] *Ann. Soc. Belge de Méd. Trop.* 1949, June 30, v. 29, No. 2, 213–22.

The rôle of mosquitoes in the transmission of *A. perstans*, no longer attributable to *Culicoides* [see above] was followed up at Léopoldville where *A. perstans* was shown to have an incidence of 15 to 20 per cent. Routine examinations of 47,432 *Anopheles gambiae*, 11,251 *Mansonioides uniformis*, 5,222 *M. africanus* and 2,069 *Anopheles moucheti* revealed no developing larvae in proboscis, thorax or abdominal cavity, though 7 to 8 per cent. of *Mansonioides* (2 spp.) showed microfilariae of *A. perstans* in the stomach contents. Experimental infections with laboratory-bred mosquitoes resulted in partial development of *A. perstans* in *Anopheles paludis* and *A. gambiae* during the cold season. During the hot season no development took place in *Culex fatigans*, *C. perfidiosus*, *C. nebulosus*, *Aëdes aegypti*, *Anopheles gambiae* and *A. paludis*, but development to the "sausage" stage took place in a single *A. moucheti* out of 28 specimens which were given an infective blood meal.

J. J. C. Buckley

Chardome, M. & Peel, E. La répartition des filaires dans la région de Coquilhatville et la transmission de *Dipetalonema streptocerca* par *Culicoïdes grahami*. [**Distribution of Filarial Worms in Coquilhatville and Transmission of *Dipetalonema streptocerca* by *Culicoides grahami*.**] *Ann. Soc. Belge de Méd. Trop.* 1949, June 30, v. 29, No. 2, 99–119, 2 maps & 1 fig.

Coquilhatville region, where *Dipetalonema streptocerca* was first found as an adult, in the Chimpanzee [this *Bulletin*, 1947, v. 44, 339], was chosen for further research on this parasite, with special reference to its distribution, incidence and transmission. Diagnosis of the infection in human populations was made by examination of material from skin scarification, which also sufficed for finding other kinds of microfilariae.

In Colquilhatville itself, microfilariae of *D. streptocerca* were found in 27·24 per cent. of 290 persons examined ; *A. perstans* in 34·82 per cent. ; *O. volvulus* in 7·93 per cent. and *L. loa* in 11·03 per cent. In Colquilhatville prison 249 prisoners were examined, 34·5 per cent. of whom showed *D. streptocerca* ; 53·81 per cent. *A. perstans* ; 16·46 per cent. *O. volvulus* and 8 per cent. *L. loa*. This group when examined at night showed 44·48 per cent. of *D. streptocerca* ; 55·02 per cent. of *A. perstans* ; 19·25 per cent. of *O. volvulus* ; 4·81 per cent. of *W. bancrofti* and 4·81 per cent. of *L. loa*. Indigenous villages of the interior, in the Bofidji region, showed high infestation rates with *D. streptocerca* and *A. perstans*, other species being extremely rare. But in the Boluki region, which is bordered by the Congo River, *D. streptocerca* was extremely rare. From examinations of children it was concluded that the average incubation period of *D. streptocerca* is four months.

In the search for the insect vector, it was found that *Simulium albivirgulatum* ingested microfilariae of *A. perstans* and *O. volvulus* but not *D. streptocerca*. *Anopheles*, *Culex*, *Mansonoides* and *Aëdes* also gave negative results, but in *Culicoides grahami* there was complete development of *D. streptocerca*. It was observed on many occasions that this insect, when fed on a carrier of both *A. perstans* and *D. streptocerca*, would pick up only microfilariae of *D. streptocerca* and very rarely were *A. perstans* microfilariae found in the ingested blood, indicating a selectivity for *C. grahami* in *D. streptocerca*. A similar selectivity was observed for *C. austeni*.

Development followed the usual course in the insect vector, the microfilariae becoming shorter and thicker and going through the sausage stage. Six days after ingestion the larvae measured 350 μ by 21 μ and on the seventh, 574 μ by 21 μ, beyond which no further increase took place. Towards the third day rudimentary digestive organs, rectal and genital cells appeared. The infective larvae found in the proboscis on the eighth day had four digitiform appendages at the posterior extremity which was somewhat inflated.

It is pointed out that these findings are incompatible with Dyce Sharp's elucidation [this *Bulletin*, 1928, v. 25, 473] of the larval development of *A. perstans* in *C. grahami* and *C. austeni*, with which the present authors now disagree. The fact that Dyce Sharp experimented, partly at least, with a subject who carried both *D. streptocerca* and *A. perstans*, suggests that he followed the development of *D. streptocerca* rather than *A. perstans*.

In conclusion it is recorded that two Europeans were found infected with *D. streptocerca*, this being the first record of its kind. *J. J. C. Buckley*

Henrard, C. & Peel, E. *Culicoïdes grahami* Austen. Vecteur de *Dipetalonema streptocerca* et non de *Acanthocheilonema perstans*. [*Culicoides grahami* **as a Vector of** *Dipetalonema streptocerca* **and not of** *Acanthocheilonema perstans*.] *Ann. Soc. Belge de Méd. Trop.* 1949, June 30, v. 29, No. 2, 127–43. [16 refs.]

The authors present in tabular form data concerning the incidence of the human filarial worms in Léopoldville Province, Lusambo Province, the Eastern Province and the Equatorial Province, in Belgian Congo. Commenting on the distribution of the different species, they note that *D. streptocerca*, like *Loa loa* and *O. volvulus* is widely distributed throughout the country, more so than *W. bancrofti*, less so than *A. perstans*. *A. perstans* is ubiquitous, whereas the other species tend to occur in foci of infection. Generally speaking, foci of *D. streptocerca* always include *A. perstans*, but the converse does not hold. Where the two occur together, *A. perstans* usually predominates, yet sometimes a carrier harbours one species only. No clinical effects have been observed in connection with *D. streptocerca* infection.

This paper is mainly concerned with the establishment of *Culicoides grahami* as vector of *Dipetalonema streptocerca* and with a strong argument that *Acanthocheilonema perstans* does not develop in the larval stage either in *C. austeni* or *C. grahami*. Experimental work was done at the village Gombe-Masaka, where *D. streptocerca* had a higher incidence even than *A. perstans*. As to the insect fauna, mosquitoes were scarce, *Sarcopsylla penetrans* [*Tunga penetrans*] seasonal, but *Culicoides*, mainly *C. grahami*, were present in enormous numbers ; *C. inornatipennis* formed only 3 per cent. of those caught. Feeding experiments confirmed that *C. grahami* only picks up microfilariae of *D. streptocerca* during a blood meal, when both it and *A. perstans* are present. In the light of this discovery, the work of Dyce Sharp [this *Bulletin*, 1928, v. 25, 473] with *C. austeni* and *A. perstans* is reviewed critically and the authors conclude that it lacks proof that the microfilariae picked up by *C. austeni*

were in reality *A. perstans* and that they were probably *D. streptocerca*. Similarly, Dyce Sharp's opinion that *C. grahami* is a vector of *A. perstans* is invalidated.

Further details of the development of *D. streptocerca* in *C. grahami*, also described by CHARDOME and PEEL [see above], are given. Of 261 specimens fed experimentally, 57 (23 per cent.) became infected : 737 specimens were dissected for natural infection in thorax or head, and of these 1·2 per cent. were positive. Feeding experiments were also carried out with *Simulium damnosum* but no development of either *D. streptocerca* or *A. perstans* took place.

Convinced that *A. perstans* is not transmitted by *Culicoides*, the authors turn their attention to this problem, now re-opened after 21 years. They stipulate that the vector should possess a long proboscis (unlike the short lacerating mouth organs of *Culicoides*) and that it should have a wide distribution and be commonly found in the tropics. Certain small species of *Culex* fulfil these conditions. The "chigger" flea, *Tunga penetrans*, is also suspect. A search was made in the latter species and of 76 dissected, 50 were found naturally infected with "sausage" larvae of unknown identity. Similar infections were subsequently found in *T. penetrans* at Léopoldville, and, moreover, the authors are now satisfied that *T. penetrans* is capable of ingesting microfilariae of *A. perstans* during a blood meal. In the absence of complete data, however, the role of *T. penetrans* in transmitting *A. perstans* is still undecided. *J. J. C. Buckley*

See also p. 87, SALAH & GHANEM, **Nocturnal Haemoglobinuria (Marchiafava-Michelli Syndrome). (Report of Two Cases.)**

BERTRAND-FONTAINE, SCHNEIDER, J., WOLFROMM, R. & CAGNARD, V. Un cas de filariose cérébrale (double hémiplégie au cours d'une filariose à *F. loa*). [**A Case of Cerebral Filariasis and Double Hemiplegia during Filariasis due to** *L. loa*.] *Bull. et Mém. Soc. Méd. Hôpit. de Paris*. 1948, Nos. 32/33, 1092–5.

With the exception of ocular localizations, visceral manifestations of filariasis are very rare and anatomical localization in the brain has not been demonstrated in man, although it has in the dog and the monkey. There have been few clinical reports suggesting cerebral localization. The authors report a case in which there is strong evidence of cerebral localization.

A man aged 31 while working in a forest area in the Cameroons noticed a transient embarrassment of the movements of the left arm and leg ; this improved and he carried on his work, but a week later he awoke in the morning with a left hemiparesis. The arm gradually recovered and the only other neurological sign was failure of the pupils to react to accommodation ; but after another week there was a severe relapse, both arms being paralysed and there were some visual disturbances and local oedema of the right wrist which persisted for three days and was followed by a transitory oedema of the left ankle. A diagnosis of filariasis was now made. There were 14,300 leucocytes with 40 per cent. eosinophiles : the percentage rose to 60 a week later. After a period of recovery he had a fit followed by a return of complete arm paralysis. The cerebrospinal fluid was normal.

A month later there had been partial recovery of the limbs, but both legs were weak and the left arm was still paralysed. Tendon reflexes were brisk and the Babinski reflex was extensor.

A thick blood film showed microfilariae of *Loa loa*. The intradermal test with filarial antigen was also positive. Treatment was started with 3,799 R.P. [further description not given]. The first day he was given 0·1 gramme in two doses, the second day 0·2 gramme, the third and fourth days 0·3 gramme and

on each of the next seven days 0·4 gramme. Despite the small doses the patient had a trembling fit with reappearance of some of the visual and neurological symptoms, *e.g.*, " pins and needles ", but after the completion of the course there was complete recovery except for the partial paralysis of the left upper limb, especially of the hand. As there was no hypertension or evidence of syphilis and a cerebral tumour was excluded by ventriculography, a second course of 3,799 R.P. was prescribed and after an interval of ten days a third course. The recovery of the leg and right arm was complete, but on the left there was still awkwardness of movement and inability to extend the fingers.

The authors give their reason for assuming that the symptoms were due to filariasis, and they suggest they were probably due either to the lodgement of adult filariae in the sub-arachnoid space which provoked a parenchymatous reaction or that microfilariae traversed the meninges and penetrated and blocked, partially or totally, certain terminal vessels. *L. E. Napier*

Mazzotti, L. **Onchocerciasis in Mexico.** [English translation.] Reprinted from *Proc. 4th Internat. Congresses on Trop. Med. & Malaria (Session I of Section VI) Washington, D.C., May, 1948.* pp. 3–8. [18 refs.]

Dr. Luis Mazzotti has published an English version of the paper which he presented at the Fourth International Congress on Tropical Medicine, held at Washington in May, 1948. The original in Spanish has already received notice in this *Bulletin* [1948, v. 45, 922]. In the English version stress is laid on two points of importance ; first, the difficulty of maintaining colonies of Simuliidae in the laboratory—many die within five days—so that a study of the life-cycle is hindered; second, the action of Hetrazan on the embryos of *Onchocerca volvulus*. In some patients the administration of Hetrazan is followed by acute attacks of an allergic character, in others the reaction is slight. The difference is believed to be due to the degree of parasitization of the skin. The Hetrazan affects disintegration of the microfilariae and if these are few in number the reaction is slight, merely local pruritus and oedema ; if many, as when a biopsy specimen reveals the presence of 100 or more, the reaction is acute, with oedema of the face, ocular congestion, erythema and thickening of the skin of the arms and trunk, pains in muscles and joints and a rise of temperature to 39·6°C., necessitating confinement to bed. After the reaction, the number of embryos is found to be much reduced in a biopsy specimen and if an adjacent lymph node be extirpated and cut many disintegrated forms are seen. In an example given by the author, fresh material expressed from the gland showed " 133 motile microfilariae, 57 slightly motile, 278 non-motile and 268 in different stages of disintegration ". Hetrazan has been accorded the property of causing the disappearance of the embryos from the skin ; the foregoing statement offers the explanation for this.

Hetrazan, which is 1-diethylcarbamyl-4-methylpiperazine dihydrogen citrate, is given in a dosage of 2 mgm. per kilo body-weight thrice daily, but more recently the author has given 2–4 mgm. per kilo three times a day for ten to 12 days and repeats the course six months later, if it is found necessary.

H. Harold Scott

Mendheim, H. & Scheid, G. Ueber die Verbreitung des Oxyurenbefalls bei Insassen eines Kinderheimes. [**The Prevalence of** *Enterobius* **Infestation among the Inmates of a Children's Home.**] *Ztschr. f. Hyg. u. Infektionskr.* 1949, Feb. 3, v. 129, Nos. 1/2, 156–61. [26 refs.]

After quoting various records to show that *Enterobius* infestation is extending in Germany, the authors give their own findings after examining 99 children,

inmates of a home in Munich. They examined them by anal loop, Cellophane smear, and their finger-nails. Eighty-one were positive ; six were under three years of age, 15 between three and six years, 42 between six and ten years, 18 over this age ; two of the children between three and six years had ova beneath their nails. At this Home, sanitation generally was at a high level and the children well looked after and cared for. Infection by dust could not be excluded [see SCHÜFFNER below]. The Cellophane strip method yielded better results than the anal loop—70 by the second smear as against 61 by the second loop test, though four more were found at the third. Fifty-eight were found positive at the first Cellophane strip test, but only 51 at the first loop examination and 16 were positive by the Cellophane method although the loop had proved negative. The severity, or degree, of infestation was determined in 18 of the children ; 12 had up to 20 ova per field [magnification not stated], three had up to 30 and three had over 30 per field. *H. Harold Scott*

KOZAR, Z. **Methods of Examination for Pinworms** (*Enterobius vermicularis*) **and their Incidence in Children in Gdańsk.** *Bull. Inst. Marine & Trop. Med., Med. Acad., Gdańsk, Poland.* 1949, v. 2, Nos. 1/2, 85–9, 1 diagram.

The author examined 850 school children, aged three to 13 years, for *Enterobius* infection. The N.I.H. swab method was used ; one examination of each child was made during the morning school session.

The infection rate of the whole group was 72·94 per cent. ; 78·8 per cent. of boys and 69·2 per cent. of girls were infected. In the two youngest age groups, about 40 per cent. of boys were infected : the curve then rose sharply to about 80 per cent. in the seven-year-old group, after which there was a further slight upward tendency and there were 90 per cent. infected in two of the age groups. The curve for girls starts at a slightly lower level but maintains materially the same shape.

A control examination of faeces by a flotation method showed 8·47 per cent. infected.

The author points out that the actual number of children infected is certainly greater than his figures indicate and that, therefore, individual treatment would be useless as re-infection would inevitably occur ; mass treatment is essential. *L. E. Napier*

MENDHEIM, H. & SCHEID, G. Morphologische und biologische Studien an Oxyuren. [**Morphological and Biological Studies on Oxyures.**] *Zent. f. Bakt.* I. Abt. Orig. 1949, Apr. 28, v. 153, No. 8, 339–42. [28 refs.]

The English summary appended to the paper is as follows :—

"1) Criticism of the data given in the literature on male oxyures. Counts made by the author in faeces showed that the relation of males to females was 3 : 10.

"2) On the strength of literature and of counts made by the author the figures given on the occurrence of oxyures in faeces are checked. Most faeces contain 10–100 parasites.

"3) Discussion of the phenomenon of swarming at certain periods. The migrations of the oxyures on the surface of the body are taken into account."

BEAVER, P. C. **Methods of Pinworm Diagnosis.** *Amer. J. Trop. Med.* 1949, July, v. 29, No. 4, 577–87. [19 refs.]

Three types of anal swabs for the diagnosis of *Enterobius vermicularis* infection were studied : (i) the NIH cellophane swab as described by HALL [this *Bulletin*,

1937, v. 34, 878], (ii) the wet pestle swab as described by SCHÜFFNER and SWELLENGREBEL [*ibid.*, 1945, v. 42, 922], and (iii) a modification of the transparent adhesive cellulose tape as suggested by GRAHAM. The technique of this modification is as follows :—

"A 3-inch strip of ¾-inch transparent adhesive cellulose tape, held by the thumb and forefinger adhesive side outward over one end of a tongue depressor, was pressed against the right and left perianal folds and then spread flat on a microscope slide for examination. The buttocks were spread enough to allow pressing the tape firmly against the line of junction between the moist outer part of the anal canal and the somewhat dry, waxy perianal folds. This is where the egg yield was almost always highest. When present in large numbers the eggs usually could be seen in some of the clearer areas through the transparent tape with the low power of the microscope. After some experience it was possible to locate quickly the zone of greatest yield and to discover some of the positive specimens immediately. If eggs were not seen within about 30 seconds or if the eggs could be counted, the tape was lifted at one end and turned back just far enough to include all of the surface that had been in contact with perianal skin, one drop (just one drop, not more) of toluene was added with a straight wooden applicator the tape was smoothed back onto the slide and levelled."

" In a small series of transparent adhesive tape specimens it was found that using a drop of toluene between the slide and the tape to clear the preparation increased the positive findings by an average of 24 per cent. and decreased the time necessary for examination by an average of 40 per cent."

" Of 236 positive specimens obtained by simultaneous use of the NIH and wet pestle swabs, 91·5 per cent. were diagnosed by wet pestle as compared with 75 per cent. by NIH swab. Respectively, the pestle and NIH preparations averaged 88 and 52 eggs per preparation."

" Of 160 positive specimens obtained by simultaneous use of the wet pestle and transparent tape, 76·3 per cent. were diagnosed by wet pestle and 95·6 per cent. by transparent tape. Respectively, the pestle and tape preparations averaged approximately 50 and 1,000 eggs." *L. E. Napier*

PAPAYANNIS, T. Analekzem und Oxyuriasis. [*Enterobius vermicularis* **Infestation and Anal Eczema.**] *Med. Klin.* 1949, July 29, v. 44, No. 30, 963–4. [12 refs.]

During recent years in Germany the numbers of persons complaining of pruritus ani and local eczematous conditions have been increasing. The author examined, by anal strip, 215 sufferers from these complaints, 129 males and 86 females, adults and children, and found that 132 (61·4 per cent.) of them were infested with *Enterobius vermicularis* ; 82 (63·5 per cent.) of the males and 50 (58·1) of the women and children. Treatment with crystal violet in tablets of 0·06 gm. for adults, 0·02 gm. for children and 0·002 gm. for infants, usually given three daily for 8 days, followed by similar courses after intervals of 8 days, sufficed to cure. In patients whose condition did not clear up on this treatment, other causes were found, such as haemorrhoids, anal fissure, diabetes and seborrhoeic eczema. *H. Harold Scott*

SCHÜFFNER, W. Experimentelle Infektionen mit Staubeiern von *Oxyuris* (*Enterobius*) *vermicularis*. [**Experimental Infestation by** *Enterobius* **Eggs in Dust.**] *Zent. f. Bakt.* I. Abt. Orig. 1947, May 2, v. 152, No. 1, 67–73. 1 fig. [23 refs.]

The author has carried out a careful experiment which shows that ova of *Enterobius vermicularis*, dry in dust, are still viable after periods up to about

3 weeks. He took samples of dust from a window-sill 2 metres up and from a cupboard in a school refractory, the dust being allowed to accumulate undisturbed for a week or two. Three days after its removal it was washed in 0·2 per cent. HCl to kill any pathogenic organisms, then passed through a hair-sieve and centrifuged, the number of eggs in the deposit estimated, dripped on to bread and ingested by volunteers. The number of ova taken ranged from 40 to 80 and the interval was noted before ova appeared in the stools. Of the 8 volunteers two were not infested ; the others were passing ova between 36 and 53 days after the ingestion, but 12 to 26 days later they were no longer to be found, indicating that the infestation is self-limited—the duration of life of *Enterobius* is believed to be between 37 and 93 days. The so-called " refractoriness " of the infestation to treatment is due to re-infestation by the fingers or by the air (dust-borne) and there is no need to bring in the idea of an intestinal life-cycle. Moreover, so long as the possibility [or likelihood] of air-borne infestation exists it is useless to expect eradication by drug treatment.

H. Harold Scott

Moynihan, I. W. & Musfeldt, Iola W. **A Study of the Incidence of Trichinosis in Swine in British Columbia.** *Canadian J. Comp. Med.* 1949, Sept., v. 13, No. 9, 224–7, 1 fig.

" Diaphragms from 1067 hogs have been examined for the presence of larvae of *Trichinella spiralis*. Trichinellid larvae were demonstrated in 48 or 4·5 percent of all specimens. Infection, however, was confined to garbage-fed hogs, with an incidence of infection of 7·1 percent. Trichinosis was demonstrated in rats collected at three of the piggeries from which positive hog tissue originated and it is suggested that the rat may play at least a minor role in the epidemiology of this disease."

Wenderoth, H. Zur Entstehung latenter Trichinosefälle. [**On the Origin of Latent Trichinosis.**] *Zent. f. Bakt.* I. Abt. Orig. 1948, Oct. 15, v. 152, No. 8, 590–99. [56 refs.]

The English summary appended to the paper is as follows :—

" With a number of persons fallen ill of latent trichinosis anacidity or subacidity of the gastric juice was stated. Experiments in vitro showed that the percentage of trichinae liberated in the unit of time is the greater the more the acidity approaches the optimum of peptic digestion. Anacid gastric secretions are ineffective.

" In duodenal juice the cysts resist the tryptic digestion for a very long time ; they react like collagenous connective tissue.

" Most of the parasites ingested with the food, can only develop if the host has a normal digestion. It is supposed that persons suffering from anacidity or subacidity have a disposition to latent or light trichinosis, while persons with normal acidity fall seriously ill when infested with the same number of parasites."

Covey, J. A., McMahon, J. J. & Myers, H. L. **Trichinosis as a Cause of Major Arterial Thrombosis.** *J. Amer. Med. Ass.* 1949, Aug. 13, v. 140, No. 15, 1212–13.

A man and wife were admitted to hospital for a severe illness which started suddenly with intense epigastric pain, belching, diarrhoea, nausea and vomiting. They both had increasing lassitude and fever. No physical signs were found in the wife and the diagnosis was not made until the husband was admitted.

The husband had respiratory symptoms also. When in hospital he developed signs of femoral thrombosis, first in the left leg, then in the right : both feet became gangrenous and he died some six weeks after the onset of the first symptoms. His wife died a few days before the husband, without signs of thrombosis.

The *Trichinella* precipitin test was positive (1 in 1280) in the wife at an early date but not in the husband until shortly before death : then it was only positive 1 in 640. *Trichinella* cysts were found in various stages of development in the skeletal muscles and diaphragm of each.

Serial section of the vessels of the wife showed perivascular leucocytic cellular infiltration, but less extensive than that observed in the husband. In the latter " there was thrombosis of the left femoral artery with gangrene of the lower extremity. Mural thrombosis was present in the aorta, and there was thrombotic occlusion of the superior and inferior mesenteric arteries. Sections of tissue from the diaphragm and leg muscle were examined for *Trichinella* and showed recent infestation. The organisms were not discovered in the walls of the femoral artery, in the thrombus itself or in the periarterial tissues. The significant finding after a thorough search by means of serial sections for a specific lesion was a periadventitial leukocytic cellular infiltration with necrosis. Perivascular leukocytic cellular infiltration was found consistently in sections taken from areas that demonstrated involvement of the vessel walls. In the neighborhood of actual vascular closure, the vessel walls appeared to be more deeply and heavily penetrated with this inflammatory infiltration."

The authors observe that perivascular leucocytic infiltration, which is a recognized lesion in trichinosis and probably of toxic origin, was present in both cases ; in the husband the process had gone further and resulted in thrombosis. *L. E. Napier*

DEFICIENCY DISEASES

MENEGHELLO, J., ESPINOZA, J. & CORONEL, Lila. **Value of Biopsy of the Liver in Nutritional Dystrophy. Evaluation of Treatment with Choline and Dried Stomach.** *Amer. J. Dis. Children.* 1949, Aug., v. 78, No. 2, 141–52, 3 figs.

The authors describe the results of eighty-nine liver biopsies on twenty-nine patients, children of Santiago, suffering from a clinical syndrome known in Chile as " polycarencial dystrophy." The clinical description indicates that this condition closely resembles the ' kwashiorkor ' syndrome, so familiar to African workers. The biopsies were taken without accident and intense hepatic fatty degeneration was found consistently. Attempts were made to correlate the degree of fatty degeneration, the severity of the symptoms and the prognosis ; it was concluded that neither the condition of the patient nor the degree of liver damage alone would permit a safe prognosis. In general, clinical improvement appeared to precede the regression of the hepatic lesion. Three of the patients died. Of the remainder, no difference in the clinical course of improvement could be detected among patients treated with dried stomach (U.S.P. preparation, dosage 10 grains (0·65 gm.) daily for 4 to 10 days), choline (dosage 5 grains (0·32 gm.) daily for 4 to 51 days) and dietary measures alone. *R. Passmore*

Irving J. T. & Selzer, G. **Effect of a South African Native Diet upon Rats.** [Correspondence.] *Nature.* 1949, Apr. 30, 677–8.

Young rats were fed on a diet consisting of liberal quantities of a thick mealie-meal porridge and fermented cow's milk. After intervals of four to six months, histological examination of the teeth revealed evidence of rickets and vitamin A deficiency. It is suggested that the vitamin A or vitamin A precursors present in the two constituents of the diet were partially destroyed by oxidative processes, when the ingredients were mixed. The rachitic condition is explained by the very low calcium and phosphate contents of the diet and by the abnormally low Ca : P ratio.

[The very limited experimental data given in this letter prevent a full appraisal of the results.] *R. Passmore*

Odendaal, W. A., with the technical assistance of P. J. Steyn. **Amino Acid and B-Vitamin Supplementation between Common Foodstuffs in South Africa.** *Clin. Proc.* Cape Town. 1949, Sept., v. 8, No. 3, 163–83, 5 figs. [54 refs.]

" With our decreased supplies of meat-stocks, increased production costs of dairy products and eggs, and with the present world food position, it is only natural that we should look for meat substitutes." This is the practical public health background for this investigation from the Department of Physiology, University of Pretoria.

A large part of the paper is taken up with a valuable review of the literature of the nutritive value of maize, soya bean, food yeast and other vegetable proteins, with particular reference to their amino-acid content. On the experimental side, the principal finding is that a mixture of maize 90 per cent., dried yeast powder 5 per cent., processed soya bean meal 5 per cent. with salt and cod-liver oil, produces excellent growth in rats. This mixture provides a full complement of amino-acids and the B-group of vitamins. On these findings it is strongly recommended for human consumption as a substitute for meat in times of shortage and as a supplement to the diets of the malnourished, expectant mothers and growing children.

[Two questions we would like to ask before becoming whole-hearted advocates of the mixture : " How is it cooked ? How does it taste ? "] *R. Passmore*

Salcedo, J., Jr., Pedroche, A., Panganiban, E. C. & DeLeon, J. F. **Artificial Enrichment of White Rice as a Solution to Endemic Beriberi. I. Preliminary Report of Field Trials.** *J. Nutrition.* 1949, Aug. 10, v. 38, No. 4, 443–51.

A large scale experiment in enrichment of rice commenced in Bataan Province in the Philippines in October 1948, in which " premix " rice impregnated with thiamine, niacin and iron pyrophosphate was added to white polished rice in such a proportion that the final mixture, known as enriched rice, contains 2·0 mgm. of thiamine, 15 mgm. of niacin and 13 mgm. of iron per pound. A preliminary beriberi survey of the experimental area was reported in this *Bulletin*, 1949, v. 46, 390. The present paper is an interim report on the acceptability of the enriched product and of the changes in certain groups attributable to its consumption over a short period.

The enriched rice proved entirely acceptable with regard to colour, taste, odour, palatability and digestibility to sample groups of individuals drawn from members of the Armed Forces, government employees, and children in government institutions. Among the children there was some evidence of a beneficial effect, as the average gains in both weight and height were greater

over a period of 8 months in the children who had been taking enriched rice than in comparable control groups. The children also showed improved haemoglobin levels and red cell counts. Limited observation points to diminution of the incidence of peripheral neuritis among members of the armed forces.

A further beriberi re-survey covering the entire population involved in the experiment (68,000 people) will be made during 1949. *Dean A. Smith*

SPRUE

FRAZER, A. C. **A New Mechanism of Vitamin Deprivation with special reference to the Sprue Syndrome.** *Brit. Med. J.* 1949, Oct. 1, 731–3, 1 diagram. [20 refs.]

Professor Frazer first reviews succinctly the peculiarities of the vitamin deficiencies observed in the sprue syndrome. He points out that the various clinical features cannot be fully explained by :—

(*a*) dietary deficiency of vitamins,
(*b*) a failure of intestinal absorption,
(*c*) a metabolic failure of the tissues to utilize vitamins.

The reasons given to exclude these possibilities appear sound and will receive general support. He then proceeds to point out that the deficiencies could be explained by a selective destruction of vitamins by various bacteria, which in the sprue syndrome invade the upper regions of the small intestine. This bacterial invasion may give rise to large bulky, fermenting stools. It may also result in competition between the bacteria and the host for nutrients essential to both. In many cases the bacteria are the successful competitors and the host consequently shows signs of deprivation.

[This is an ingenious hypothesis that must appeal to all who have thought about the extraordinary diversity of the deficiency states associated with sprue. It should stimulate teams of clinicians and microbiologists to find ways and means of verification and probably at the same time a basis of rational therapy.] *R. Passmore*

FOX, H. J. **Absorption of Unemulsified and Emulsified Vitamin A in Sprue.** *J. Lab. & Clin. Med.* 1949, Aug., v. 34, No. 8, 1140–44.

One of the chief results of the sprue syndrome is the impaired absorptive power of the small intestine. Vitamin A deficiency does not always manifest itself by clinical evidence, but may be demonstrated by biochemical methods. The vitamin A levels in this study were determined by technical procedures, the details of which are given and summarized in two tables.

In 8 normal adults the feeding of unemulsified vitamin A ester in fish liver oil produced significant rises in plasma vitamin A. When the same group was given emulsified vitamin A acetate in " Tween " (Atlas Powder Co., an effective non-toxic emulsifying agent) a similar, but higher peak level in plasma vitamin A was produced. The emulsified material accelerated absorption in one instance, producing a peak rise at three hours compared to a peak reached in five hours in the remainder of this group.

Eight adult patients with active sprue who required a maintenance dosage of folic acid or liver therapy and all of whom continued to show diarrhoea, were given unemulsified vitamin A ester in fish liver oil. Very poor absorption resulted, the maximum rise of vitamin A being quite low in every patient.

When preparations of emulsified vitamin A acetate in Tween were given to the same group, a very marked increase in plasma vitamin A occurred of about the same degree as seen in normal controls.

In a group of 6 patients with sprue in remission fed similarly the results were, with one exception, comparable with those in normal controls.

The implication of these data may be of practical importance in the management of steatorrhoea. It is probable that the poor absorption of vitamin A, as well as fats, results from a defective emulsifying system in the small intestinal tract, suggesting the need for the addition of an emulsifying agent to the diet.

P. Manson-Bahr

Frazer, A. C. **Fat Metabolism and the Sprue Syndrome.** *Brit. Med. J.* 1949, Oct. 8, 769–73, 2 figs. [32 refs.]

British Med. J. 1949, Oct. 8, 798–9. **Fat Absorption.**

Defective fat absorption must be regarded as an essential part of sprue syndrome. This should include non-tropical sprue (idiopathic steatorrhoea), tropical sprue and the coeliac syndrome in children. To these may be added some cases of gastro-colic fistula. Other cases of defective fat absorption are not usually associated with a sufficient number of the characteristic features of the sprue syndrome to warrant their inclusion in this group.

Differences are observed between non-tropical sprue, tropical sprue and coeliac disease. The anaemia in the coeliac syndrome is usually microcytic, probably due to iron deficiency. It is probable that different factors are operative in the three varieties of the syndrome.

Tropical sprue can occur in epidemic outbreaks involving groups under similar environmental conditions. In tropical sprue recovery is the rule, but with non-tropical sprue and coeliac disease complete recovery is relatively rare.

Absorption from the intestine is considered in three phases: an intraluminar, a cellular and a distributive phase. The details of these have been described in previous communications [this *Bulletin*, 1948, v. 45, 105].

The general aspects of fat absorption in the sprue syndrome consist mainly of a fat absorption defect, only 50–70 per cent. being absorbed. Fat-loading tests show that this defect is proportionate to the amount ingested. With regard to fat assimilation, fats containing a large quantity of long-chain saturated fatty acids were less well tolerated by sprue patients than by normal persons. Those with the sprue syndrome tolerated milk and milk products better than mutton or beef fats. The faeces contained abnormal amounts of long-chain fatty acids up to 30 gm. or more in 24 hours. The neutral fat was usually about 80 per cent. hydrolysed, and the fatty acids were often present as crystals and could be shown to have a high melting point, high molecular weight and low iodine value. Volatile short-chain fatty acids were often present in large quantities.

The detailed study of fat absorption showed certain differences from the normal. Hydrolysis and initial emulsification in the upper part of the small intestine seemed to be within normal limits. The reason for these differences from the normal is obscure. All the usual enzymes were present, in approximately normal concentrations, with the possible exception of lysozyme. Bacteria were present in large numbers in the upper intestine, especially in achlorhydric patients. The bacteria present were intestinal flora normally confined to the lower part of the intestine.

With regard to the cellular and distributive phases, low blood phospholipid and cholesterol were usual. The oral glucose tolerance curve was commonly depressed.

It is concluded that there is interference with particulate absorption in the sprue syndrome and that larger quantities than normal of fatty acid are both absorbed and excreted. It is not possible to determine whether interference with particulate absorption occurs in the intraluminar or cellular phase.

More mucin is present in the small intestine than in a normal person. An increased quantity of long-chain fatty acids is at least responsible for excessive quantities of mucus. Long-chain fatty acids may cause irritation and diarrhoea and excessive fatty acid formation might be responsible for inadequate absorption of calcium and iron. The hypochlorhydria observed in sprue may be due to the absorption of abnormal quantities of long-chain fatty acids.

A decrease of phospholipid and cholesterol is usually seen in the blood, either due to faulty absorption or to faulty synthesis.

The probable interrelationship of these various effects of abnormal fat absorption in the sprue syndrome is traced. Faulty particulate absorption of unhydrolysed fat results in increased hydrolysis ; the long-chain fatty acids are partly absorbed, causing increased mucus which may interfere with particulate absorption. The long-chain saturated fatty acids are not absorbed and pass out into the faeces. By taking this as the basic fault in the fat-absorption mechanism the main features of the sprue syndrome are readily explained. The radiographic " deficiency pattern " has been shown to be due to flocculation of the barium sulphate suspension with mucus. The changes in cholesterol and phospholipids may follow from failure of particulate absorption or from the effects of excessive amounts of long-chain fatty acids on liver function.

Eight main causative factors of the sprue syndrome have been suggested—dietary, structural defects of the intestinal cell, disturbances of the electrolytic metabolism (adrenal cortical insufficiency), defective phosphorylation, emotional factors, starch fermentation, intestinal flora and vitamin deficiencies.

P. Manson-Bahr

HAEMATOLOGY

LEHMANN, H. & BAIRD, R. B. **Haemoglobin Estimation by the Cyan Haematin Method. Modification for Use in Warm Climates.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1949, July, v. 43, No. 1, 67–74.

The authors found that when the cyan haematin method was performed at the higher temperatures experienced in a tropical country, it gave about 5 per cent. higher readings than did the alkaline haematin method. The higher the temperature at which the blood is incubated with 0·1 *N* HCl to form acid haematin, before its conversion into cyan haematin, the higher the reading and the greater the error. The authors believe that the difference is due to the partial denaturation of the histon, globin, when incubated in 0·1 *N* HCl in the presence of the non-haemoglobin constituents of the red cells, and that this leads to a turbidity appearing when cyanide is added.

This turbidity can be lessened by several methods—by cooling the acid haematin solution before adding the cyanide, by lowering the temperature at which the acid haematin is formed, by adding 0·033 *M* NaCl, or by transforming acid haematin into alkaline haematin before its conversion into cyan haematin without any other alteration in the original method. By any of these methods the results obtained correspond very closely to those arrived at by the alkaline haematin method of CLEGG and KING (*Brit. Med. J.*, 1942, Sept. 19, 329).

L. E. Napier

Bibile, S. W., Cullumbine, H., Kirtisinghe, C., Wickramanayake, T. W. & Watson, R. S. **Red Blood Cell, Haemoglobin, White Blood Cell, and Blood Sugar Standards for Ceylonese Adults.** *Ceylon J. Med. Sci.* (Sect. D.) 1949, June, v. 6, Pt. 2, 83–7. [14 refs.]

Chini, V. & Valeri, C. M. **Mediterranean Hemopathic Syndromes.** *Blood.* 1949, Sept., v. 4, No. 9, 989–1013, 1 fig. [277 refs.]

See also p. 57, Stransky & Quintos, **On Hookworm Anemia (Aplastic Anemia in Hookworm Disease).**

Cuthbertson, W. F. J., Lloyd, Joan F., Emery, W. B. & Lees, K. A. **The Vitamin B_{12} Concentration in Liver Extracts and a Note on the Relationship between Clinical Response and B_{12} Dosage.** *J. Pharm. & Pharmacol.* 1949, Oct., v. 1, No. 10, 705–9.

Schneider, Rose G., Levin, W. C. & Haggard, Mary E. **Carbonic Anhydrase Activity in Sickle Cell Anemia, Sickle Cell Trait, and Pernicious Anemia.** *J. Lab. & Clin. Med.* 1949, Sept., v. 34, No. 9, 1249–53.

"1. The carbonic anhydrase content of red blood cells exhibiting the sickling phenomenon corresponds to that of normal red blood cells.

"2. Washing red blood cells of individuals with sickle cell anemia or sickle cell trait with isotonic saline until sickling no longer occurs results in no significant loss of carbonic anhydrase activity.

"3. Addition of carbonic anhydrase to washed cells from which the sickling capacity has been removed does not restore this capacity.

"4. Carbonic anhydrase, under conditions described, has no effect on the sickling phenomenon.

"5. Confirmatory evidence is presented that in pernicious anemia unit values of carbonic anhydrase in respect to red blood cell count and hemoglobin are about twice those of normal individuals."

VENOMS AND ANTIVENENES

Mohammed, A. H. **Purified Toxins from Cobra and Bee.** [Correspondence.] *Lancet.* 1949, Oct. 15, 716–17.

With fresh venom from the cobra (*Naja tripudians*) the author uses two methods for preparing a purified toxin. The first consists of dilution with saline (100 times), clarification with aluminium sulphate and lime water, after which the toxin is precipitated with acetone, washed with acetone and ether and dried. Alternatively the precipitate may be concentrated under reduced pressure at 30°C. and the toxin crystallized by drying *in vacuo* over P_2O_5. (0·03 mgm./100 gm. of the toxin kills albino rats).

In the second method, the venom is diluted 100 times with N/10 HCl; then neutralized with NaOH. Saturated picric acid is added. After standing 24 hours the precipitate is separated and repeatedly extracted with 80 per cent. acetone-water. The toxin is precipitated by adding HCl and an excess of acetone. The dried product showed an m. l. d. of 0·03 mgm. per 100 gm. rat.

From tests reported on solutions of the products (1·0 mgm./ml.) the substance is claimed to be a proteose.

Toxin from the hive-bee (*Apis mellifica*) was prepared by essentially the second method.

[The evidence presented to show that the toxin has been prepared in crystalline form is not convincing. Many protein solutions, dried over P_2O_5 as described, appear macroscopically to be crystalline but are not in crystalline form.] *C. G. Pope*

Goyal, R. K. **Studies of Suitable Methods for the Preparation of Anti-Snake-Venom Sera on Commercial Scale.** *J. Indian Med. Ass.* 1949, July, v. 18, No. 10, 366–8.

For many years antivenom sera have been prepared in India by injecting horses subcutaneously with mixtures of cobra and daboia venoms in gradually increasing doses.

Variations in these methods were investigated by Goyal. The use of venom "toxoids" (venoms detoxicated with formalin) instead of "toxins" gave disappointing results and is not recommended. The second group of experiments was more successful; horses which had received a primary course were given maintenance and re-immunization doses of cobra and daboia venoms ("toxins") *intravenously*. The result was a big saving of venoms, and the general avoidance of the abscesses and ill health usually observed after subcutaneous injections of venoms. Some ill-effects occurred, including the death of one of 23 horses within a few minutes of intravenous injection, and these are discussed.

Horses which did not respond well were often improved by resting for 3 to 8 months. [The value of long rest-periods has also been shown for antigens other than venoms.] Some horses which had been undergoing immunization for upwards of 5 years were regarded as bad responders to maintenance doses, but gave higher titres after big doses of venoms subcutaneously than small doses intravenously. [There is considerable variation in the methods of immunization used in different countries, and French and South African workers claim more success with formalinized venoms.] *H. J. Parish*

Hoxter, G. & Decoussau, D. Concentração, purificação e controle fisico-quimico dos soros antitoxicos e antipeçonhentos. [**Concentration, Purification and Chemical Control of Antitoxic and Antivenom Sera.**] *Mem. Inst. Butantan.* 1948, v. 21, 187–201. English summary.

Arantes, J. B. & Brandão, C. H. Antigenos e anticorpos botrópicos. I. Contribuição ao estudo da dosagem dos soros antibotrópicos polivalentes. [**Bothrops Antigens and Antibodies: I. Study of Dosages of Polyvalent Anti-Bothrops Sera.**] *Mem. Inst. Butantan.* 1948, v. 21, 153–77, 20 graphs & 1 fig. [13 refs.] English summary.

Arantes, J. B. & Brandão, C. H. Antigenos e anticorpos botrópicos. II. Contribuição ao estudo da produção de soros antibotrópicos monovalentes. (Nota prévia.) [**Bothrops Antigens and Antibodies: II. Production of Monovalent Anti-Bothrops Sera.**] *Mem. Inst. Butantan.* 1948, v. 21, 255–60, 3 figs. English summary (8 lines).

Gunn, M. A. R. **Localized Fat Atrophy after Jelly-Fish Sting.** [Memoranda.] *Brit. Med. J.* 1949, Sept. 24, 687, 1 fig.

A young woman, while bathing in Ceylon, was stung by a jelly-fish on the anterior part of the left thigh and the left leg just above the ankle. Considerable pain and urticaria were present in the affected areas, but there were no

general symptoms: the urticaria subsided after a week of rest in bed and calamine lotion, but a discoloured area remained which did not fade completely for some six months. Oedema of the left foot and ankle appeared on the second day and lasted for three weeks.

Two months later the patient noticed that the left leg was becoming thinner: measurements of the leg and thigh showed a decrease of 4·4 cm. in the thigh and 1·9 cm. above the ankle. The subcutaneous fat had apparently disappeared completely, but there were no neuro-muscular manifestations. Six months later, some redisposition of the fat had taken place and there appeared to be a slow return to normal.

The author discusses the usual manifestations of jelly-fish stings, which suggest excessive liberation of histamine. He also refers to the observation that lipodystrophy is well recognized in diabetic patients having insulin: this is especially frequent in children, less so in women, but scarcely ever in adult males. It is suggested that this observation may have some bearing on the present case. *H. J. O'D. Burke-Gaffney*

See also p. 81, EARLE, **Fuetazo Dermatitis.**

DERMATOLOGY AND FUNGUS DISEASES

FOX, E. C. **Tropical Anhidrotic Asthenia: Thermogenic Anhidrosis.** *Arch. Dermat. & Syph.* 1949, Aug., v. 60, No. 2, 173–80. [Refs. in footnotes.]

The investigations of ALLEN and O'BRIEN [this *Bulletin*, 1945, v. 42, 313] suggest that superficial obstruction of the sweat ducts by horny plugs plays an important rôle in the causation of anhidrotic asthenia. They believe that thermogenic anhidrosis is to be regarded as a sequela of severe, extensive prickly heat, or at least as the result of some fundamental process producing occlusion of the sweat gland openings, with failure of the sweat to reach the surface and cool the body by evaporating.

The author of this article describes a typical example of this condition. The patient was a young Marine who did patrol duty in a tank by day and slept in it at night. After a period of excessive sweating with some prickly heat, there developed weakness, exhaustion, sensation of warmth, dizziness, headache, palpitation, and rapid respiration. On his evacuation to hospital it was noticed that there was extensive generalized dryness of his skin with a few fine papules over the body. Exertion produced warmth of the body, profuse sweating of the head and neck, an increase in respiratory and pulse rates and elevation of temperature and blood pressure. On his remaining in bed in a cool environment his symptoms gradually subsided, and after four weeks he could walk briskly, and, later, run a few hundred feet before symptoms were reproduced.

Three other patients, all presenting the classical symptoms of this condition, were observed, and each made a complete recovery after three to five weeks' rest in a cool environment.

The fifth patient was a white man aged 24 who first became ill while in New Guinea in 1944. There developed dryness, scaling and peeling of the palms and soles, which gradually increased to involve the entire body with a generalized exfoliative dermatitis. During the height of the dermatitis he noticed that the body was dry, without any evidence of perspiration, and that there was excessive perspiration about the face and neck.

After a year in hospital there was much improvement, but extensive anhidrosis remained at the end of two years. As regards the aetiology of this condition, the significant process was a defect of keratenization with the production of hyperkeratotic plugs which obstructed the sweat gland ducts. It was, however, difficult to reconcile the individual, purely mechanical obstruction of hundreds of thousands of sweat gland duct orifices with the usually rapid return of sweating in a cool environment. This "apparatus failure" might represent an organ which rebels at further activity after prolonged, excessive overproduction of secretion. The author felt that some fundamental pathological process of systemic origin must produce this syndrome, although it was probably unrelated to control of sweating by either the central or the peripheral nervous system. *H. T. H. Wilson*

HORNE, G. O. & MOLE, R. H. **The Effect of Water and Salt Intake on Prickly Heat.** *Lancet.* 1949, Aug. 13, 279–81, 1 fig. [10 refs.]

Two observations regarding the increased liability to prickly heat after the taking of extra salt led to the undertaking of the experiment reported here.

During May and June, the subjects, 10 members of a hospital staff at Karachi, carried out their usual duties and ate their ordinary diet which was cooked with salt; they were subjected to periods of extra fluid intake and extra salt intake. During periods of increased fluid intake they drank 8–12 pints of water in addition to their normal intake, but no extra salt. During periods of extra salt intake, from 10 to 15 grammes were taken daily in food and drink. The subjects were examined at frequent intervals and the degree of prickly heat was noted. An arbitrary grading was adopted which took into account the subjective and objective symptoms.

The immediate effect of increased water intake was to increase discomfort, but after two to three days there was definite improvement or actual relief of symptoms in eight out of the ten persons. When the extra salt was taken and the water intake reduced to normal, there was a relapse of prickly heat in five persons.

Reference is made to other observations, including those of FAY and SUSMAN [this *Bulletin*, 1946, v. 43, 781] and two unpublished experiments, both of which appear to confirm that increased salt intake increases prickly heat. In one of the latter, the above experiment was repeated at Cawnpore where the drier and hotter climate made excessive water intake easy; in four of seven subjects with severe prickly heat, who had developed an additional salt intake of 10 grammes, 15 pints of water daily caused striking improvement within a week.

The authors consider that the sodium ion is the important factor. They also note that sodium chloride is stored in the skin and they suggest that relatively low fluid intake may allow concentration to occur and produce a local lesion. *L. E. Napier*

NOVY, F. G., Jr. **A Severe Form of Acne developing in the Tropics.** *Arch. Dermat. & Syph.* 1949, Aug., v. 60, No. 2, 206–16. [Refs. in footnotes.]

Severe acne in the tropics was known before the war, but did not receive much attention. In the recent war, however, "tropical acne" was found to be a severe and disabling disease, characterized by large pustules, draining sinuses, and extensive disfiguring scars, frequently keloidal.

The author of this article was able to observe 100 patients suffering from tropical acne, and found that it differed in many respects from typical acne

vulgaris. Older patients were affected, the average age of incidence being 22·75 years. Although most of the patients had had mild acne before the war, there was not a high incidence of severe previous acne. In tropical acne the back and chest were frequently involved, and lesions on the buttocks and thighs were not uncommon. In only 42 out of 151 cases quoted was the face affected, whereas the previous acne vulgaris attacked the face in 82 per cent. of cases.

As regards the individual lesions in "tropical acne", large comedos, groups of comedos and double comedos were common. The ordinary acne papules were not often observed, their place being taken by larger nodules. These became very painful when secondarily infected. When the disease was severe individual nodules would be so close together that they would form plaques. These plaques had many draining sinuses with subcutaneous communications between them. Many of the lesions were linear, and some of them would be 8 to 10 cm. long and 2 to 3 cm. wide when the exudate ultimately dried up, the area was filled up with granulation tissue, and a keloid scar was frequently left.

The aetiology of tropical acne remains unknown, but it would appear that the hot, humid, climate of the tropics produces an overactivity of the sebaceous glands, which results in plugging of the ducts and leads to the production of comedos and cyst formation. Secondary infection produces pustules and eventual scarring.

While they remained in the tropics the condition of these patients usually became progressively worse, but the majority soon improved after returning to a cooler climate. *H. T. H. Wilson*

EARLE, K. V. **Fuetazo Dermatitis.** *J. Trop. Med. & Hyg.* 1949, Sept., v. 52, No. 9, 183–7, 2 figs. [23 refs.]

The "*fuetazo*" beetle (*Poederus ornaticornis*) is a blackish-green insect not exceeding 1 cm. in length. A variety of lesions are caused by contact with fluids from this insect, and workmen engaged in oil exploration on the coast of Ecuador are frequently incapacitated as a result. The beetles appear with the first rains in December or January and make intermittent appearances thereafter until the onset of the dry season in May or June. The most characteristic lesion is a papulo-vesicular one, and it is usually seen on the exposed parts. Linear grouping is common on the face owing to the fact that the insect is dragged along the skin whilst being brushed off by the victim's hand. The line of redness and oedema seen in the early stages are the reason for the name of *fuetazo* (Spanish for whiplash). Lesions may be seen where the insect has been crushed beneath the collar or round the waist where it has fallen down to be crushed by the belt. The shoulders and ankles are other common sites, while fingers which have squashed the insect may transfer the irritant substance to the eyes, nostrils, or other parts of the skin. The nature of the irritant is uncertain; cantharidin has been suggested, but there is no proof that this is in fact the irritant concerned.

From personal observation the author of this article found that the insects produced no lesions when allowed to crawl over the body, but when the juice of a crushed insect was rubbed into the skin itching developed at the site within a few hours. The itching was followed by erythema, and a papulo-vesicular lesion developed which underwent pustulation and did not heal until the fifth day after the experiment.

As regards treatment, workmen should be warned to refrain from crushing these insects on their skin, or if they have inadvertently done so, to wash the

part as soon as possible with soap and water. Conjunctivitis resulting from this cause was treated with the following lotion :—

Sodium bicarbonate	1 gm.
Sodium biborate	1 gm.
Sodium chloride	1 gm.
Glycerin	4 gm.
Distilled water	250 cc.

While for the skin vesicles, the following formula was found useful :—

Butesin picrate	1·0 per cent.
White wax	12·3 per cent.
Paraffin	15 per cent.
Mineral oil	52·6 per cent.
Sodium borate	0·5 per cent.
Distilled water	18·6 per cent.

H. T. H. Wilson

Kessel, J. F., Yeaman, Antoinette & Holtzwart, Frances. **Mycoses encountered in the Pacific Southwest Area of the United States of North America.** *New Zealand Med. J.* 1949, Aug., v. 48, No. 266, 346–56, 4 figs. [36 refs.]

This paper, presented at the Seventh Pacific Science Congress, held in New Zealand in 1949, is a popular account of the systemic fungus diseases encountered in the South-western United States. The species of fungi isolated from systemic mycoses in the Los Angeles County Hospital between 1933 and 1948, with the numbers of isolates, were *Coccidioides immitis* (93), *Blastomyces dermatitidis* (4), *Histoplasma capsulatum* (2), *Sporotrichum schencki* (2), *Cryptococcus neoformans* (11), *Candida albicans* (6), *Actinomyces bovis* (29), *Nocardia asteroides* (3) and *Aspergillus fumigatus* (1). These figures stress the relative importance of the endemic coccidioidomycosis but the numbers of isolates relating to other fungus diseases, over the 15-year period, are remarkably low. After a brief review of recent work on coccidioidomycosis, the authors discuss the importance of geographical distribution in the epidemiological study of fungus diseases, and they illustrate this by reference to the three outstanding mycoses of the United States : coccidioidomycosis, blastomycosis and histoplasmosis.

A useful feature of the paper is a scheme, in outline, for the laboratory diagnosis of mycoses, which includes instructions on collection and dispatch of materials, laboratory and other examinations and a brief description of the complement-fixation test which is shown to be superior to all other serological tests for the diagnosis of coccidioidomycosis and even for determining prognosis in this disease. *J. T. Duncan*

Guy, R., Panisset, M. & Frappier, A. **Histoplasmin Sensitivity. II. A Brief Study of the Incidence of Hypersensitivity to Histoplasmin in an Indian Tribe of Northern Quebec.** *Canadian J. Pub. Health.* 1949, July, v. 40, No. 7, 306–9.

The report of an earlier investigation on the incidence of reactors to the histoplasmin skin sensitivity test in southern Quebec, by Guy, Roy, Poupart & Panisset [*Bulletin of Hygiene*, 1949, v. 24, 652] showed that out of 75 school children in Beloeil, near Montreal, 20 were histoplasmin-sensitive. In view of the findings of Palmer [*Bulletin of Hygiene*, 1946, v. 21, 665] and others,

of a very high rate of reactors to the test in the Mississippi basin and adjacent parts of the east-central area of the United States with a progressive decline in the reactor rate at increasing distances from this area, it was decided to carry out tuberculin and histoplasmin tests on Indians living in the most northerly part of Quebec. In all, 161 children and adults were examined in northern Quebec and 8 were found to be sensitive to both histoplasmin and tuberculin. In a comparable group of 65 school children between the ages of 5 and 15 years in northern Quebec, only one was histoplasmin-sensitive, against 20 in a similar group of 75 children in southern Quebec. The rate of reactors to tuberculin was higher in northern than in southern Quebec.

J. T. Duncan

JELLIFFE, D. B. **Histoplasmosis of Darling (Reticulo-Endothelial Cytomycosis).** *J. Trop. Med. & Hyg.* 1949, Sept., v. 52, No. 9, 177–82, 1 fig. [37 refs.]

The author gives a useful summary of the literature on histoplasmosis and refers to a suspected case from Northern Sudan which, apparently, underwent spontaneous cure. [Diagnosis was based on histological examination of a single gland.] *J. T. Duncan*

KUNSTADTER, R. H., WHITCOMB, Frances C. & MILZER, A. **Primary Histoplasmosis with Recovery of *Histoplasma capsulatum* from the Blood and Bronchial Secretions.** *J. Lab. & Clin. Med.* 1949, Sept., v. 34, No. 9, 1290–97, 7 figs.

Report of a case.

BRAS, G., RIJKEBUSCH, L., KOTTER, G. F. & DJOA LIANG HAM. **Clinical, Pathological and Mycological Observations in Histoplasmosis.** *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1949, June, v. 1, No. 2, 151–9, 8 figs. [36 refs.]

The authors describe a fatal case of histoplasmosis in a male Chinese aged 43, a native of Java, who also suffered from pulmonary and generalized tuberculosis. The duration of histoplasmosis, from the time of onset of observed signs and symptoms until death, was 5 months, but tuberculosis was probably the primary cause of death.

Although the case presented no unique feature, some points of clinical and pathological interest are worth recording : Lesions on the skin were a prominent feature, and these consisted of papules measuring from 0·1 to 0·5 cm. in diameter, more or less generalized but most numerous in the lower abdominal and adductor regions. Some of the papules showed superficial necrosis and apical ulceration. The eruption of skin papules was preceded by the appearance of similar papules in the mouth ; on the buccal mucosa, the dorsum of the tongue, the hard palate and the pharynx. Spreading ulceration of the mucosa was not mentioned. Other tissues and organs affected were the adrenals, spleen, lymph nodes, bone marrow and the mucosa of the larynx, oesophagus and rectum. Sections of the affected tissues showed that the lesions of tuberculosis and histoplasmosis were distinct and discrete and there was no intermingling of the infections. Preparations stained by Gram's method showed variable results ; the parasite in some being well stained but in others being scarcely distinguishable. Giemsa's stain was more satisfactory.

The presence of *Histoplasma capsulatum* in the sputum was demonstrated by microscopy, by culture and by inoculation into guineapigs and mice. From

sowings of sputum or emulsified infected tissues on blood-agar, incubated at 37°C., the yeast-like form of the fungus developed, and on transplanting to another medium and incubating at 28°C., the yeast form was converted to the characteristic mycelial form.

This was the third case of histoplasmosis reported in Java and the first in which the diagnosis was confirmed by cultivation of the parasite.

J. T. Duncan

MACKINNON, J. E., MONTEMAYOR, L. & VINELLI, H. Observaciones personales sobre la morfología de *Paracoccidioides brasiliensis* en los tejidos. [**Personal Observations on the Morphology of** *Paracoccidioides brasiliensis* **in the Tissues.**] *An. Facul. de Med. Montevideo.* 1949, v. 34, Nos. 4/5, 453–60, 11 figs. [16 refs.] English summary.

The identification of *Paracoccidioides brasiliensis* in material from the lesions is the common means of diagnosis in South American blastomycosis. Many authors describe the spherules of the fungus in the tissues as thick-walled and having a double contour, but SOUZA CAMPOS and ALMEIDA [this *Bulletin*, 1928, v. 25, 745] described the multiple budding of the parasite through a thin capsule or cell wall, and FONSECA, while recognizing a thin limiting membrane considered it to represent only the external lamina separated from the remainder of a thick capsule.

The present study of sections stained by Heidenhain's iron haematoxylin and Gallego's method, showed the fungal cells to have a thin capsule enclosing an achromatic zone of uneven thickness around the stained cell contents. This clear zone, which may be mistaken for a thick cell wall, appears to be caused by the contraction of the cell protoplasm during fixation of the tissue. External to the thin membrane is another clear space in which the buds of the fungus may be seen. This, again, is not regarded as a capsular structure but a space left by the shrinkage of the cytoplasm of the host cell in which the parasite lies. The multiple buds appear as tubular herniations of the cell wall, but pores or slits in the wall through which preformed spores may escape were not seen, although small vacuoles in the protoplasm may tend to simulate such pores. After multiple budding, the parent cell dies, but very old cells may be seen with thin walls and much shrunken contents. *J. T. Duncan*

MACKINNON, J. E. & VINELLI, H. Observaciones sobre la forma multibrotante de *Paracoccidioides brasiliensis* en los cultivos. [**Observations on the Multiple-Budding Form of** *Paracoccidioides brasiliensis* **in Cultures.**] *An. Facul. de Med. Montevideo.* 1949, v. 34, Nos. 4/5, 461–70, 18 figs. English summary.

The yeast-like form of *Paracoccidioides brasiliensis* was developed in culture, from sowings of the normal mycelial form on blood agar, by incubation at 37°C. The cultures studied were of two ages, 4 to 7 days and 18 to 20 days old. Preparations for microscopy were made by dispersing a minute amount of culture in a drop of horse serum on a cover slip. The drop was spread by inclining the glass and the smear was fixed as a wet preparation by placing it face downwards in a dish of Bouin's picro-formol solution, in which it was allowed to remain for 2 to 24 hours. Staining was done by the iron haematoxylin method. This technique insured that the buds would not be dislodged from the parent cells and distortion and shrinkage of the cells would be minimal.

The morphology of the culture yeasts was shown to be similar to that of the parasitic yeasts in the tissues. Reproduction by multiple budding was seen and the cell wall was shown to be very thin—about 0·2 to 0·3 μ in thickness—and separated from the stained contents of the cell by a clear space. The yeasts varied much in size but averaged about 13 μ in diameter. Cells of 6 to 10 μ in diameter were the most fertile and were frequently covered with little buds about 1 μ in diameter, which increased in size. Larger cells, up to 18 μ in diameter, showed " simple " budding and bore about 6 buds, and intermediate stages between these and the smaller cells were seen. Very large cells between 30 and 40 μ or larger, seen in the older cultures, were usually sterile and often deformed and collapsed. *J. T. Duncan*

Smale, L. E. & Birsner, J. W. **Maternal Deaths from Coccidioidomycosis.** *J. Amer. Med. Ass.* 1949, Aug. 6, v. 140, No. 14, 1152–4.

Disseminated coccidioidomycosis as a special cause of death in pregnancy has not previously been reported. In Kern County Hospital, California, during 1948, there were 2,410 deliveries with 4 deaths, three of which were due to disseminated coccidioidomycosis. The authors describe 5 cases of the coccidioidal disease in the parturient, 4 of which have already proved fatal and the fifth, with signs of meningeal involvement, should inevitably die of the disease. The first patient, with extensive generalized disease, was delivered of a stillborn infant and died 3 days later. The second, with signs of intracranial infection and serological findings which indicated dissemination of the disease, was delivered of a full term, healthy baby ; but the mother died 3 months later. The third patient, with extensive disseminated disease, was delivered prematurely and died the following day. The infant lived for 25 days and then died from aspiration asphyxia, but an autopsy showed no sign of coccidioidal infection. The fourth patient was seen in the 39th week of pregnancy and within the next few days she developed paretic signs which were believed to indicate acute poliomyelitis. Two weeks later the foetal heart sounds ceased and the mother died on the following day, undelivered. At necropsy she was found to have disseminated coccidioidomycosis. The fifth patient, who had a history of 3 abortions, suffered from severe headache accompanied by vomiting and meningeal signs. She was delivered of a full term healthy infant. In her case the diagnosis of coccidioidomycosis was based on the results of serological tests and the headaches, which persisted, were taken to indicate coccidioidal meningitis. She was discharged from hospital with a bad prognosis.

Necropsies were performed on three of the women and one infant. In the disseminated disease all the systems were affected except the alimentary and reproductive systems Coccidioidal infection was not found in the infant nor in the placentas examined, and its absence also from the endometrium and uterus seems to indicate that congenital infection does not occur.

J. T. Duncan

MISCELLANEOUS DISEASES

Davies, J. N. P. **Sex Hormone Upset in Africans.** *Brit. Med. J.* 1949, Sept. 24, 676–9. [37 refs.]

The author remarks on the evidence which shows that from early childhood a high proportion of Africans have damaged livers and that, when this condition is present, the organ is unable to inactivate oestrogens. Lipotropic factor

deficiency causes fatty infiltration of the liver similar to that found in the condition described as kwashiorkor. Anthropologists have long tried to explain the origin of racial characteristics by the action of hormones and have so explained the slender build of the Bantu (castration effect). It may be noted that the hair of the body and beard of Africans is very often soft and downy, that they rarely need to shave, while in health their skins are soft and satiny (feminization effect).

Gynaecomastia, uncommon in temperate regions, is relatively common in Africans, and TROWELL in 1948 in a survey of 500 apparently healthy railway workers found this condition in 5 per cent. of cases [this *Bulletin*, 1949, v. 46, 158]. The author considers that testicular atrophy and oligospermia are common in Africans, while inguinal hernia in males is undoubtedly frequent.

Although goitre is not uncommon, thyrotoxicosis is extremely rare and it is suggested that this may be due to oestrinization. In females cystic hyperplasia, now attributed to excessive oestrogen formation, is common. Evidence of infertility is difficult to obtain but the abortion rate is believed to be high.

Relatively few Africans live to reach the cancerous age. Figures are given from the necropsy records at Mulago and from examination of biopsy specimens at Kampala Laboratory between 1931 and 1949, in Africans only. Instances of metastatic growths, where the primary source was not stated, are not included in the table below :—

	Biopsy	Necropsy	Total
Carcinoma	690	101	791
Sarcoma	158	12	170
Reticulo-endothelial tumours	181	36	217
Special tumours (melanoma, teratoma, adamantinoma, retinoblastoma, etc.) ...	114	17	131
Total ...	1,143	166	1,309

Another table shows that 7·8 per cent. of breast carcinomata occurred in males, as compared with 0·82 per cent. in England and Wales in 1938, and the author thinks that this higher incidence is due to some endocrine cause.

Reticulo-endothelial neoplasms figure highly in this series, many of the endotheliomas arising from lymph glands. Lymphosarcoma appears predominatingly in young males and runs an acute course.

Primary liver carcinoma appears to be common in Africans, and so far no satisfactory explanation of its frequency has been found, but it is suggested that it may be produced by oestrinization. From both cancerous and non-cancerous livers in Africans, but not in Europeans or American negroes, carcinogenic substances have been isolated. The incidence of endometrial cancer appears to be relatively high in Uganda.

The author considers that these observations should be supported by studies of the sex hormone excretion in Africans. Oestrin causes changes in personality and mentality which may be of the greatest importance, and it is suggested that, owing to widespread malnutrition and liver damage, Africans are subject to wholesale oestrinization. [As remarked, these observations require to be supported by the study of the excretion of sex hormones in Africans.]

C. F. Shelton

BRINK, A. J. **The Coronary Vessels in the Bantu. A Preliminary Report on the Coronary Artery Pattern in the Adult Bantu.** *Clin. Proc.* Cape Town. 1949, Sept., v. 8, No. 3, 137–49, 12 figs. [16 refs.]

Bibile, S. W., Cullumbine, H., Kirtisinghe, C., Watson, R. S. & Wikramanayake, T. **The Variation, with Age and Sex, of Blood Pressure and Pulse Rate, for Ceylonese Subjects.** *Ceylon J. Med. Sci.* (Sect. D.) 1949, June, v. 6, Pt. 2, 79–82.

Salah, M. & Ghanem, M. D. **Nocturnal Haemoglobinuria (Marchiafava-Michelli Syndrome). (Report of Two Cases.)** *J. Roy. Egyptian Med. Ass.* 1949, June-July, v. 32, Nos. 6/7, 548–59. [25 refs.]

The different forms of paroxysmal haemoglobinuria are discussed. Two cases are reported in which the authors believe that the diagnosis was Marchiafava-Micheli syndrome (spelt Michelli throughout) ; one of these patients had filariasis.

This patient was a student, aged 23, who passed dark-colour urine each morning for periods of about four days, usually, but one attack lasted a month. The urine cleared during the day. The attacks recurred at intervals varying from one week to many months. The attacks were unrelated to climate, season, food, cold, exertion or posture, but appeared usually to be precipitated by exhaustion from study, late nights, and " psychic upsets." The attacks were accompanied by back pains and sometimes feverishness. There was no relevant family history and no history of syphilis, malaria, taking of drugs, or allergic manifestations.

The patient was yellow and the spleen was felt two inches below the costal margin. His haemoglobin was 55 per cent. and red cells 2,850,000 per cmm. No malaria parasites were found but the night blood contained microfilariae of *Wuchereria bancrofti*.

The urine contained oxyhaemoglobin and methaemoglobin during the attacks and haemosiderin for three weeks after the attacks.

Various experiments were made to try to precipitate an attack. Adrenaline, histamine and luminal failed, but an afternoon attack was induced by typhoid vaccine.

The presence of nocturnal microfilariae " provokes the search for a possible relationship."

There was no evidence of filariasis in the other case. *L. E. Napier*

Ransmeier, J. C. **Tick Paralysis in the Eastern United States. A Summary, with Report of Four New Cases from Georgia.** *J. Pediatrics.* St. Louis. 1949, Mar., v. 34, No. 3, 299–308. [31 refs.]

An excellent account of tick paralysis, the general symptoms of which are well known to readers of this *Bulletin*. The main interest of the present contribution lies in the fact of a new, or at least an extending, geographical distribution of the disease. It was first described in Australia a century ago ; early in the present century it was reported as occurring in sheep and later in other animals in South Africa and in 1912 from British Columbia and soon after from Oregon and Idaho and from Crete and Jugoslavia in Europe. In America it was not known outside the western States till 1938 when cases were reported from South Carolina and Georgia in the east. The author now gives details of four more cases in Georgia, all in children, 3 whites aged 2, 3 and 4 years, and a negro girl of 6 years. Cases may be, and probably are, confused with anterior poliomyelitis, for the seasonal prevalence is the same and unless the cause—a tick, often found adhering to the scalp—is removed death may result, whereas its complete removal is followed by prompt improvement and recovery in a few days.

The actual, proximate cause seems to be a potent neurotoxin which, however, has not yet been isolated or identified. The tick feeds for some days before the nervous symptoms develop. The author's description is very graphic and could not be improved upon :

" Irritability may be noted twenty-four hours before appearance of motor symptoms. Mild diarrhea may occur. Often the first alarming symptoms appear in the morning when on arising the child shows weakness and poor control of the legs, staggering and falling. Sensory changes are usually absent, but there may be hyperesthesia and paresthesia in the affected extremities. Flaccid paralysis soon develops and ascends in one or more days to involve the trunk, arms, neck, tongue, and pharynx. Tendon reflexes are diminished or absent. If the trunk is affected the abdominal reflexes are also unobtainable. There is little or no stiffness of the neck and back. With the appearance of bulbar involvement the voice becomes thick and nasal ; the child is unable to swallow and chokes on pharyngeal secretions. Nystagmus and strabismus are sometimes noted, and in infants terminal convulsions may occur. The respirations become abdominal in type, shallow, rapid, and finally irregular. Restlessness gives way to stupor and death results from paralysis of the respiratory muscles or from respiratory obstruction by aspirated material."

The tick which causes this condition in the north-western States and in Canada is *Dermacentor andersoni* ; this is not known to occur in the east and in the cases referred to above the incriminated insect was *D. variabilis* which is found extensively in the eastern States and also in Texas, Oklahoma, Nebraska and California. *Amblyomma americanum*, which infests the southern and south-eastern States and may convey spotted fever and tularaemia (as do *D. andersoni* and *D. variabilis*) has so far not been incriminating as causing tick paralysis. *H. Harold Scott*

LECKS, H. I. **Favism. Report of a Case in a Child.** *J. Pediatrics.* St. Louis. 1949, Mar., v. 34, No. 3, 309–14.

An Italian boy, 4 years of age, was brought to the author on account of jaundice which it was found had come on the day after the child had eaten two raw beans of *Vicia fava* ; he had also been given some cooked beans the same evening. When he was seen there was moderate jaundice, mucous membranes were pale, pulse-rate 120 per minute, an apical systolic murmur, but no cardiac enlargement, cyanosis or dyspnoea. Two days later the liver was enlarged and could be felt 2·5 cm. below the costal margin, but was not tender. There was severe anaemia, red cells 2,100,000 per cmm., some stippling, anisocytosis and polychromatophilia, haemoglobin 5·4 gm. per 100 cc., leucocytes 16,000, no eosinophiles. The only treatment was iron sulphate by mouth and the child was discharged 9 days after admission, much improved ; red cells 3·5 million, Hb. 10·5 gm., no jaundice, no cardiac murmur and the liver just palpable below the costal margin. The malaise, asthenia and dyspnoea which are seen in some patients are due to the associated anaemia.

Experiments with extracts of the bean failed to produce any allergy or sensitization. Nevertheless, any case of jaundice of sudden onset in an Italian child—the bean is a common article of diet among Italians in the United States—should lead to careful inquiry as to the possibility of favism.

H. Harold Scott

PROTOZOOLOGY: GENERAL

Rodhain, J. & Hendrix, H. Un cas d'infection spontanée par *Toxoplasma* chez la marmotte. [**Natural Infection of a Marmot with** *Toxoplasma*.] *C.R. Soc. Biol.* 1948, Dec., v. 142, Nos. 23/24, 1583–5.

Mention is made of the wide range of animals naturally infected with *Toxoplasma*, viz. rodents, carnivora, marsupials, monkeys, including the ape (chimpanzee) and the herbivora. The reptilia are omitted from this list although they are also known to be infected.

The infection here described was found in a marmot, *Arctomys marmota*, recently arrived at the Antwerp Zoo. Intestinal ulceration and a friable liver were the chief macroscopic findings.

In both situations smears and sections showed a heavy infection with *Toxoplasma*.

In the liver the chief site of infection was the Kupffer cells although the liver cells were also infected.

In the intestine, no parasites were found in the epithelium and the chief site of invasion was the capillary endothelium and histiocytes in the submucous tissues.

While the clinical signs and symptoms of human infections are becoming better known, we are in ignorance of the natural mode of infection and it is this fact which induced the authors to record this further case of a naturally occurring infection. *H. E. Shortt*

Nutt, A. B., Wright, T., Bowie, J. H. & Beattie, C. P. **A Case of Toxoplasmosis.** *Brit. Med. J.* 1949, Oct. 22, 905–7, 2 figs. & 1 diagram.

A female child was noticed to be partially blind and squinting at the age of 18 months, and on ophthalmoscopic examination was found to have bilateral chorio-retinitis. By the age of 4 years she had developed a convergent strabismus and a searching nystagmus, and she was mentally retarded. In one eye there was advanced optic atrophy, in addition to the other macular lesions. Serological tests were carried out by the authors and by Sabin in the U.S.A. Intradermal tests showed that the serum neutralized a 1/10,000 dilution of *Toxoplasma*, there was a positive dye test (1 : 1024) and complement was fixed in 1 in 10 dilution. The parents of the child and her brother and sister showed no abnormalities, except for positive serological reactions (of a low degree) in the mother.

[The authors diagnose this case as one of congenital toxoplasmosis. Another case in England was diagnosed on clinical and serological grounds last year [this *Bulletin*, 1949, v. 46, 401]. Apart from these two cases, the disease has not been reported in Britain [but see below] and in the opinion of the reviewer it would be wiser to use the expression " presumptive cases of toxoplasmosis " until the presence of the organism itself has been demonstrated.]

P. C. C. Garnham

Farquhar, H. G. & Turner, W. M. L. **Congenital Toxoplasmosis. Report of Two Cases.** *Arch. Dis. in Childhood.* 1949, June, v. 24, No. 118, 137–42, 5 figs. [18 refs.]

In man four distinct types of toxoplasmosis are recognized. There are the prenatal or neonatal form, an encephalitis affecting older children, an acute febrile exanthematous form in adults and a mild or symptomless form only

recognized by the presence of specific antibodies in the blood or by the birth of an infected child. The cases described in this communication belong to the first type.

The clinical and laboratory findings in this type of case are summarized as follows :—

1. Signs of pathological changes in the central nervous system.
2. Changes in the cerebrospinal fluid.
3. Disorders of the eyes.
4. The presence of specific antibodies in the blood.
5. Isolation of the parasite.
6. Other occasional findings relating to various organs.

The pathology in man is briefly described. Age would appear to be an important factor. Thus in the adult the lungs appear to be chiefly affected although other organs may suffer, while in the infant the central nervous system is the site of election for the parasite. The lesions in the latter type of case are described.

The case histories of two patients seen in Britain are given in detail. Each was a prematurely born infant. Each showed radiological signs of calcification in the brain and dilatation of the ventricular system. The sera of both children and mothers contained toxoplasma antibodies. No toxoplasma organisms were isolated from either case but animal inoculation was not resorted to.

The significance of serological tests is discussed and it is suggested that the disease may be more frequent in Britain than is generally realized.

H. E. Shortt

Paraense, W. L. A ausencia de ação terapeutica da "Paludrine" na toxoplasmose experimental. [**The Ineffectiveness of "Paludrine" against** *Toxoplasma*.] *Mem. Inst. Oswaldo Cruz.* 1948, Sept., v. 46, No. 3, 639–45. English summary.

ENTOMOLOGY AND INSECTICIDES: GENERAL

Harant, H. & Brygoo, E. Note préliminaire sur quelques tabanides africains. [**Preliminary Note on some African Tabinids.**] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 7/8, 370–71.

Uchida, S. **Studies on the Biting-Lice (Mallophaga) of Japan and Adjacent Territories (Suborder Ischnocera Pt. II).** *Japanese Med. J.* 1948, Dec., v. 1, No. 6, 535–56, 9 figs. [56 refs.]

David, W. A. L. **Air Transport and Insects of Agricultural Importance.** 11 pp. [42 refs.] 1949. London: Commonwealth Institute of Entomology, 41, Queen's Gate, S.W.7. [1*s.* 6*d.*]

The author reviews the data concerning the importance of aircraft in relation to transporting agricultural pest insects, and summarizes the records of their occurrence in aircraft.

In discussing methods of disinfesting aeroplanes, he emphasizes that spraying is the only feasible means. Fumigation has been tried, but it is difficult to seal the machines, except those with pressurized cabins. Vapours toxic to man are practically essential, which precludes treatment with passengers aboard. Treatments with dusts are scarcely likely to be completely effective and leave unsightly residues.

The spray treatment of aircraft has evolved from the use of various types of hand-operated atomizers to the almost universal use of pressure-produced aerosols, one of the most common being the " Freon bomb." Aerosols generated by this and other means fulfil the requirements of being adequately effective, innocuous to man and not harmful to furnishings or fittings of the aircraft. Aerosols, however, leave no residual deposit and the author considers that they should be used in conjunction with DDT residual films applied to the interior of the aircraft.

The precise manner and time of treatment with an aerosol is of great importance. Sometimes the machine is treated before passengers embark, which is convenient, but does not exclude insects brought in with the passengers or their hand luggage. Separate freight compartments certainly should be treated before sealing and a machine that has been overhauled at night (when bright lights may attract insects to it) ought to be sprayed heavily at the conclusion.

Some authorities advocate treatment in flight, which is a logical procedure. Unfortunately there are several disadvantages. A heavier dose has to be used than for stationary machines because of a constant draught through the machine. The emission of a strong aerosol is likely to annoy air-sick passengers or those with very young children. Furthermore, the treatment has to be done by one of the air crew who may have other duties and perhaps may be distracted from absolutely effective performance.

Finally the aeroplane may be disinfested by ground staff after arrival and before the passengers disembark. This is the usual procedure in most countries, the only disadvantage being that the passengers are kept waiting for five or ten minutes in a stationary plane which often becomes excessively hot and uncomfortable when it is standing in the sun in hot countries. *J. R. Busvine*

David, W. A. L. & Tew, R. P. **Disinsectisation of Aircraft.** *Monthly Bull. Ministry of Health & Pub. Health Lab. Service (directed by Med. Res. Council).* 1949, Aug., v. 8, 166–72, 1 fig.

To prevent the passage of mosquitoes infected with yellow fever, the Indian Aircraft (Public Health) Rules, 1946, require all planes en route between Africa and India to be treated with insecticide in a standard manner. The usual (most convenient) method, is to discharge an aerosol throughout the compartment of the plane, according to the following specification :—

" (*a*) A pyrethrum-DDT aerosol containing not less than 0·2 per cent. pyrethrins and 3 per cent. DDT, or a pyrethrum aerosol only, without DDT, containing not less than 0·4 per cent. pyrethrins applied from an aerosol dispenser at a rate of not less than 15 seconds per 1,000 cubic feet of free air space ; the stopcock in the case of an aerosol dispenser other than the Westinghouse type being kept open not less than half a turn during the operation and in the Westinghouse type the cap being removed completely. All openings into the aircraft shall be kept tightly closed during the spraying and for a period of not less than three minutes thereafter."

In the past, the British Overseas Airways Corporation have used surplus stocks of American "Westinghouse" aerosol dispensers; but as supplies were becoming low it became necessary to seek a substitute. As part of the investigation, the efficacy of various commercially available dispensers was considered and also that of the lever-controlled, carbon dioxide-propelled "Porton-Sparklets" dispenser was investigated.

1. *Results of laboratory tests.*

The rates of output of three American types of aerosol bombs were measured by operating them for various periods. It was found that there was a wide range of variation in output, not only between the different types but as between individual sprayers of the same type. A difference of double the output (in gm. per second) was quite usual, even with the same sprayer used on different occasions.

Three tests with the "Porton-Sparklets" dispenser gave much more uniform results (0·95, 1·02 and 0·91 ml. per sec.).

As regards the type of aerosol produced, the "Porton-Sparklets" dispenser was not unlike the American Westinghouse, thus :—

Sprayer	Drop diameter range (microns)	Majority in range (microns)
American	1–36	5–15
Porton-Sparklets	1–20	3–8

2. *Results of tests in aircraft.*

Some tests were conducted in passenger aircraft at Hurn Airport on two occasions, in August and December. Two species of mosquito were used: *Aëdes aegypti* and *Anopheles maculipennis*, and the housefly, *Musca domestica*, was included for comparison. The insects were laboratory-bred and were kept in a warmed room (21°C.) at the airport. Two "York" type aircraft were used for the experiments of respectively 2,770 and 3,380 cu. ft. The insects were exposed in small wire mesh cages at four different points inside the aircraft. After use of the atomizers, the plane would be kept closed for ten minutes and the knockdown of insects then recorded before they were removed to the warmed room. Mortality counts were taken next day.

The results of fourteen tests are given with different combinations of insecticides and dosage. From these results, the following conclusions are drawn.

(*a*) The performance of aerosols with a ten-minute exposure period is rather erratic, probably owing to uneven distribution. With a shorter exposure time, even more erratic results would be expected.

(*b*) The effect of temperature was not fully examined. Since *Aëdes* were observed not to fly at 15°C., they might therefore escape full exposure to the mist and it is recommended that treatments should not be done below 20°C.

(*c*) The "Westinghouse" bomb used at 15 secs. per 1,000 cu. ft. gave incomplete knockdown of all insects after ten minutes. The 24 hour kills were: *Aëdes* 100 per cent., *Anopheles* 98 per cent. and *Musca* less than 5 per cent.

(*d*) The Westinghouse bomb used on the BOAC procedure (3 bombs per plane: a much heavier dose) gave 100 per cent. KD (knockdown) of both mosquitoes and 90 per cent. KD of *Musca* after 10 minutes. The 24-hour kills were: *Aëdes* 100 per cent., *Anopheles* 66 per cent. [an inconsistency probably due to uneven distribution] and *Musca* 50 per cent.

(*e*) The tests with the "Magik Mist" and "Bridgeport" dispensers were unfortunately incomplete (owing to high death rates among controls due to

December conditions). Compared with the "Westinghouse" bomb, they appeared to give inferior KD of mosquitoes but better KD and kill of *Musca*.

(*f*) The "Porton Sparklets" dispenser gave an accurately measured dose of insecticide and produced better results than any of the commercial generators, as far as kill was concerned.

There is one serious disadvantage to the formulae which were used with the "Porton-Sparklets" dispenser: this was the use of methylene chloride as a vehicle for the DDT or BHC. Methylene chloride, like many other organic solvents, tends to cause "crazing" of "Perspex" which is widely used for the pilot's cabin and other observation windows. Crazing is the development of numerous minute cracks which interfere with vision and (even more serious in pressurized aircraft) seriously weakens the plastic "Perspex". Freon 12, which has a very low boiling point is, perhaps for that reason, free from this risk of crazing. Further research is being conducted to prepare formulae which can be used with the Porton-Sparklets dispensers and which are free from crazing hazard. *J. R. Busvine*

WHITTINGHAM, H. & GALLEY, R. A. E. **The Disinsectisation of Aircraft: Recent Progress of Work in the United Kingdom and Colonies.** *Monthly Bull. Ministry of Health & Pub. Health Lab. Service* (*directed by Med. Res. Council*). 1949, Sept., v. 8, 186–7.

A short note in which it is shown that the following solution gave the best results, of several tested, in all positions in the aircraft :—

Gamma-BHC 10 per cent. concentrate	50 ml.
Pyrethrum extract (6·5 per cent. w/v pyrethrins)	30 ml.
Sesame oil	50 ml.
Methylene chloride	865 ml.

It was propelled by carbon dioxide aerosol dispenser, and the authors state that results with this dispenser (and other solutions) were in general better than with Freon aerosol bombs. All *Aëdes*, *Anopheles* and *Musca* in the aircraft were killed in 24 hours.

Later work, however, showed that the methylene chloride caused instantaneous "crazing" (formation of cracks) in the Perspex windows of aircraft. This is a serious defect, and methylene chloride cannot, therefore, be recommended. Further work is in progress. *Charles Wilcocks*

PAGE, A. B. P.; STRINGER, A.; BLACKITH, R. E. **Bioassay Systems for the Pyrethrins. I. Water-Base Sprays against** *Aëdes aegypti* **L. and other Flying Insects** [PAGE, STRINGER & BLACKITH]. *Ann. Applied Biol.* 1949, June, v. 36, No. 2, 225–43, 16 figs. [13 refs.] **II. The Mode of Action of Pyrethrum Synergists** [PAGE & BLACKITH]. *Ibid.* 244–9, 1 fig. [14 refs.]

I. Previous methods of assaying insecticidal action of aerosols against flying insects have arbitrarily selected the conditions of dosage and concentration. A careful study has been made by the present authors (using aluminium chloride as an ingredient in the spray which could afterwards be washed off the insects and estimated chemically) to determine how much spray an insect picks up under various conditions.

The results showed a curious, complex relationship between pick-up and dosage (*i.e.* amount sprayed per unit volume) or concentration. As either of these two last factors was increased, the first effect was to reach a certain threshold which (owing to the pyrethrin content of the spray) irritated the insects

and induced flight. Beyond this threshold, the pick-up of spray was very greatly increased owing to the greater pick-up by a flying (as opposed to a stationary) insect. Further increases of dosage or concentration lead to rapid accumulation of pyrethrins on the insect to an extent which causes paralysis (or "knock-down"); thereafter the pick-up falls off rapidly for obvious reasons. The relationships between pick-up of insecticide, dosage and concentration are illustrated by a 3-dimensional graph. It is clear that these relationships must be considered when devising comparative tests between aerosol insecticides.

An interesting observation in connexion with this work was that increases of concentration or dosage beyond a certain point have no effect on the rate of paralysis. Under these conditions, the minimum time of paralysis is approximately 2·5 minutes, which is determined solely by the time taken for the pyrethrins to penetrate the cuticle. Calculations made on this basis indicate that the site of action of the pyrethrum must be very close to the surface of the insect: probably about 0·2μ (and not more than 1·0μ) deep.

II. Further work with the same methods provides information on the mode of action of pyrethrum synergists sessamin and isobutyl undecyleneamide. The effect of these substances increases as their concentration rises until a 1 : 1 ratio with the pyrethrin molecules is attained. Thereafter no further reduction in knockdown threshold is obtained, which suggests that the synergists do not act by facilitating penetration of the cuticle (which was once supposed). The maximum effect of these two synergists is an increase of three times the action of the pyrethrum. It is suggested that a surface complex between pyrethrum and synergist is formed on the peripheral nerve sheath interfaces, resulting in a reorientation of the pyrethrum molecules to give greater toxicity.

J. R. Busvine

FAY, R. W., BAKER, W. C. & GRAINGER, Mary M. **Laboratory Studies on the resistance of *Anopheles quadrimaculatus* to DDT and other Insecticides.** *J. National Malaria Soc.* 1949, June, v. 8, No. 2, 137–46. [26 refs.]

The experiments recorded were done in an attempt to breed insecticide-resistant races of *A. quadrimaculatus* by exposing them to partly lethal deposits of the insecticides in each of five generations and breeding from the survivors. In order to augment the selective effect, the sexes were separated before mating and exposed separately. The exposure was made for varying periods in a wooden cage 3×3×12 inches treated with insecticide at the rate of 200 mgm. per sq. ft. Between twelve and sixteen replicate tests were done in each generation. After the fifth generation, the insects were bred, without any selection, to give the sixth generation, which was tested for resistance to insecticides in the same way.

The principal results are set out as twenty-four-hour mortalities after standard exposures to the various insecticides in each generation. With Chlordane, benzene hexachloride, "Insecticide 118" (a proprietary material) and DDD (dichlor diphenyl dichlorethane) no significant variation in kill was observed throughout. With DDT (at two separate exposure times) and with Methoxychlor (methoxy analogue of DDT), however, there was a statistically significant drop in kill in the second generation (*i.e.* progeny from the first selective test) which is maintained, but not increased, up to the fifth generation. The sixth generation (from unselected parents) revert to the original level of susceptibility of the first generation. Various theories are discussed to account for these results, but without definite conclusions. *J. R. Busvine*

Fay, R. W. & Sheppard, Elizabeth H. *Anopheles quadrimaculatus* **Activity Patterns in the Laboratory on Untreated and DDT-treated Surfaces.** *J. National Malaria Soc.* 1949, June, v. 8, No. 2, 147–58, 10 figs. [10 refs.]

The detailed behaviour of mosquitoes (*A. quadrimaculatus*) in a small chamber above a plywood or filter paper surface was observed (individual mosquitoes being used over a period of an hour) and related to the treatment or non-treatment of these surfaces with DDT. The chamber was formed by a 1½-inch-diameter glass cylinder with a " plexiglass " [? plastic] plunger pushed down to within one inch of the test surface. Observations were related to two-minute observation periods.

The results may be summarized under various headings, thus :—

Time in contact with test surface.—With untreated surfaces, the mosquitoes spent about 80 per cent. of time in contact with plywood and 70 per cent. with filter paper. If the surfaces were treated with DDT (at 200 mgm./sq. ft.) the mosquitoes spent longer on filter paper than on plywood ; the proportionate times fell to about 50 and 30 per cent. respectively for 8 to 20 minutes, rose to 80 and 50 per cent. at 28 minutes and fell again to about 20 per cent. at the end of the hour.

Number of changes of surface.—With untreated surfaces, the number of changes per 2-minute period fell very slowly from about 1·3 to about 0·8 at the end of the hour. With treated surfaces the number of changes was much higher (2 to 3) for the first 20 minutes and then fell sharply to below the level of untreated surfaces.

Activity.—On untreated surfaces, activity remained about constant throughout (about 80 per cent. of the time still, 15 per cent. walking and 5 per cent. flying). On treated surfaces, there was very much more walking (30–50 per cent.) for the first 20 minutes and a correspondingly lower proportion of time resting. Then activity declined almost to zero by 44 minutes. Flying was slightly more frequent at first and later declined.

Cleaning and probing actions.—Activity of this type was very much more common on treated than untreated surfaces during the first 25 to 30 minutes.

Onset of signs of intoxication.—Agitation induced by DDT appeared rapidly (75 per cent. of mosquitoes showing it in ten minutes). Ataxia and hind-leg paralysis became evident more slowly, it requiring 30 to 40 minutes for 50 per cent. of the mosquitoes to be affected. Complete prostration began to be evident, in a few insects, after 24 minutes, and by 1 hour 60 per cent. were down. Middle-leg and front-leg paralysis were the last signs evident in smaller proportions of the treated insects.

A block histogram shows the proportions of insects dying 24 hours after contact periods of different lengths. A period of 20 to 30 minutes was required for 50 per cent. mortality and 40 minutes for a 90 per cent. kill.

Previous observations to the effect that mosquitoes may recover from severe DDT intoxication are confirmed. *J. R. Busvine*

Raley, T. G. & Davis, E. D. **Observations on the Use of Toxic Briquettes for Mosquito Control.** *Mosquito News.* 1949, June, v. 9, No. 2, 68–71, 2 figs.

Briquettes can be used as long-lasting larva control agents if consideration is given to the particular kind necessary for the larval sites in question. Some types are ineffective in still water because the toxicant is not distributed throughout. Thus, a jar containing emulsifiable DDT and plaster in motionless water was found to kill only larvae directly above it. Better results can be obtained with a briquette made of sawdust, casting plaster and insecticide

if it is kept near the level of the water. Suspension on wires is not recommended, because the water level may fluctuate. Best results are obtained with a briquette fixed to a small wooden float (if necessary anchored to the middle of a pond). The following formula was found to maintain effective control of larvae (in such places as household drains) for three months :—

Two hundred gm. plaster, 1 cup wood shavings, 20 gm. *gamma* BHC (" Isotox " 25 per cent. W/P), 50 gm. DDT and 200 cc. water. The mixture is added to a mould round nails in a small piece of board.

For streams and other breeding sites with running water the briquette may disseminate too rapidly to give persistent control. This may be checked by putting it in a perforated can. *J. R. Busvine*

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS

War Office. **Statistical Report on the Health of the Army 1943–1945.** pp. x +294, 46 charts. 1948. London : H.M. Stationery Office. [20*s.*]

This report is reviewed in *Bulletin of Hygiene*, 1949, v. 24, 539.

Rhodesia, Southern. **Report on the Public Health for the Year 1948** [Morris, R. M., Medical Director & Chief Health Officer]. 45 pp., 1949. Salisbury : Rhodesian Printing and Publishing Co., Ltd.

This report is divided into an Introduction and 5 chapters, with 17 appendices, and is so crowded with information that it is difficult to condense the account. The Medical Department in April, 1948, attained full Divisional Status under the Minister of Health. Dr. Morris, the Secretary of Health, is Medical Director and Chief Health Officer and has, to assist him, a Director of Curative Services who deals with the clinical aspect and a Director of Preventive Services for the Public Health aspect. The policy of the former is to build up large hospitals with every modern facility in the two chief centres, Salisbury and Bulawayo, and small cottage hospitals for local needs ; this naturally means high relative costs for a restricted service. Under the new organization, creating a Ministerial Portfolio of Health, the staff consists of 86 medical officers, 6 at headquarters, 59 in districts, 10 specialists and 11 resident medical officers. There are 5 dental surgeons, 18 health inspectors, 18 laboratory staff and 579 nurses.

The Clinic System for Africans has proved a great success and the call for more has been such that a rule has had to be made that no more can be established unless the place is more than 20 miles from existing curative facilities. The Nursing Service is largely recruited from England, but some nurses are also obtained from the Union of South Africa, and a few locally, but, as Dr. Morris somewhat unchivalrously put it, " wastage, almost entirely caused by marriage, remains at a very high level." There are 10 District Nurses, but only two of them are on the permanent staff. The temporary district nurses are the wives of Civil Servants who may be moved elsewhere at any time —an unsatisfactory state of things. There are training schools for male African nursing orderlies at Salisbury and Bulawayo, one for female nursing assistants in Bulawayo, and one for female maternity assistants in Umtali.

There are two main laboratories, one at Salisbury, the other at Bulawayo, and subsidiary ones at Umtali and Gwelo. Details of their work are given below.

As regards Preventive work, the policy is to divide the Colony into 5 regions, each with its Medical Officer of Health, a Senior Health Inspector and a subordinate staff. A start to implement this has already been made. Matabeleland has a regional M.O.H. and three Health Inspectors. The remainder of the Colony is serviced by health inspectors directed from headquarters. Municipalities and town management boards are, by the Public Health Act, local authorities in health matters. Two of the six municipalities employ full-time officers, the others employ general practitioners part-time.

Vital Statistics.—The population on 30th June, 1948, was estimated at 1,977,160, an increase of just over 400,000 in the past 5 years. This total is made up by Europeans 103,000, Asiatics 3,280, Coloured 4,880 and Africans 1,866,000 (stated as a " provisional figure ").

European births numbered 2,853 (which includes 34 illegitimate births), an annual birth-rate of 27·7 per 1,000 (that for England and Wales is given as 17·9) ; European deaths numbered 821, or 8 per 1,000 ; infant deaths, 92, give an I.M.R. of 32 per 1,000 live births ; there were in addition 4 still-births. Maternal deaths, 4, give an M.M.R. of 1·4 per 1,000 live births. The chief causes of infant mortality were prematurity, congenital malformations, malaria, birth injuries and enteritis. The causes of European deaths were, in order, heart disease (including affections of the coronary vessels, the myocardium, pericardium and valves) 165 ; intracranial lesions of vascular origin, 49 ; cancer of the digestive organs, 48 ; malaria, 32 ; diabetes mellitus, 24 ; respiratory tuberculosis, 20, and lobar pneumonia, 15.

A few words are called for on special diseases important in the Colony :—

1. *Smallpox* has increased much in the past 4 years. In 1945 there were 33 cases, no deaths ; in 1946, 181 cases, 1 fatal (0·5 per cent.) ; in 1947, 685 cases, 117 deaths (17·0) ; in 1948, 1,823 cases and 428 deaths (23·4) ; 4 were European cases, 2 fatal, 1,819 non-europeans, 426 fatal.

2. *Chickenpox* comes next, with 248 European and 440 non-European cases ; no fatalities.

3. *Pulmonary tuberculosis* was notified in 42 Europeans (16 were fatal) and 370 non-Europeans (76 fatal). Non-pulmonary tuberculosis [not specified] 4 Europeans, 3 fatal, and 34 non-Europeans, 6 fatal.

4. *Diphtheria.*—66 European notifications, 1 death ; 420 non-European, 45 deaths. A combination of active and passive immunization of children is being carried out.

5. *Typhoid fever.*—36 European cases, 4 fatal ; 175 non-European, 17 fatal. An explosive outbreak, probably water-borne, occurred near Selukwe and towards the end of the year, a smaller outbreak in the Bulawayo Municipal area.

6. *Malaria* admissions to hospital numbered 1,187 (17 fatal) and 4 cases of *blackwater fever* were treated in Government hospitals ; for the first time in 58 years of record all recovered. Mepacrine and paludrine [proguanil] are on sale to the public at all post-offices. Experience with paludrine has been conflicting. Research surveys have shown that *Anopheles funestus*, at one time the most important vector of malaria in Southern Rhodesia, has now become relatively uncommon. No explanation is offered for this.

7. *Leprosy.*—There are three institutions receiving these patients, at Ngomahura, Mtemwa and Mnene, the last two for Africans only. On the register at the beginning of the year were 1,369 ; 262 were admitted during the year and 106 readmitted for treatment ; 134 were discharged, 61 died and 112 deserted. Altogether during the year 1,739 received treatment and at the end of the year 1,444 were on the register. Much progress has been observed since diasone and sulphetrone have been used in place of moogrol.

8. *Schistosomiasis.*—Research has been undertaken on the use of Miracil D by mouth in the treatment of this disease. It has proved very serviceable for *S. haematobium* infestation in a dosage of 60 mgm. per kilo body-weight, spread over 3 to 5 days. With *S. mansoni* it has not proved so satisfactory and larger doses seem to be required. An important point of research has been taken up, namely a digestive technique of autopsy tissues with a view to determining the distribution of schistosome ova in the body. It was found that ova were present in all the organs and in the muscles and subcutaneous tissues.

Copper sulphate is distributed free to any landowner for use as a molluscicide but few seem to have availed themselves of the offer. A film on African schistosomiasis was prepared for demonstration to medical and scientific audiences.

Mention may be made here that, during examination of blood-films in a routine survey for malaria parasites and trypanosomes, 5 cases of infestation by *Wuchereria bancrofti* were discovered—the first record of this in Southern Rhodesia natives.

Hospitals.—European hospital admissions totalled 14,996, or 142·8 per 1,000 [elsewhere, in a tabulated statement of details of 15 hospitals, European admissions total 14,666] and the average stay in hospital was 10 days. There were 403 deaths among these. Admissions of Africans totalled 46,386 and 2,239 died. Out-patient attendances totalled 364,464, of which 50,212 were Europeans. There are only 123 maternity beds—far too few for the needs of the Colony. There are 12 Maternity Homes, 10 under Government and 2 private. Two thousand seven hundred and sixty-five patients were admitted during the year; there were 4 maternal deaths, 2,531 live births.

The number of beds for which the Native hospitals were designed was 1,258, but during the year 43,751 patients were admitted and the daily average was 1,604. There are 79 Native Clinics to which 95,811 patients were admitted; in-patient units [this term is not defined] numbered 1,895,820, and 237,805 out-patients received treatment. Three fresh Clinics were opened during the year, 12 are to be begun in 1949 and 38 more are under consideration.

Thirty-four Medical Missions are State-aided and at these 31,555 received in-patient treatment and 185,173 treatment as out-patients.

Mines.—Shortage of building material has limited improvement of housing and sanitation in the mines. New mines which are being developed and so start *de novo* are better than the old in this respect. The average number of men employed in the mines is 63,794; there were 515 deaths (8·07 per 1,000), 80 from accidents. The chief causes of sickness and death were malaria, 5,216 (18 deaths); venereal diseases 2,553 (28); dysentery and diarrhoea, 1,366 (9); pneumonia, 937 (78); phthisis, 77 (52) and heart disease, 68 (55).

Schools.—There are 99 European schools with an attendance of 17,271 children; 15 schools for the Coloured and Asiatics at which 2,491 attend, and 9 for Africans with 4,409. These are inspected regularly. There are also 2,019 Government-aided schools with 205,237 attending; these are not regularly inspected.

Laboratories.—Work at the laboratories has been heavy, consisting of the usual examinations of clinical pathology. At the Public Health Laboratory, Salisbury, altogether 83,924 examinations were carried out; included among these were 21,650 urine examinations, 19,907 serological tests for syphilis, 1,909 sputa and 5,592 blood-films for parasites. At the Bulawayo Laboratory, a total of 68,967 investigations were made, of which 18,641 were urines, 19,209 serological tests for syphilis, 3,121 sputa and 4,537 blood-films for parasites. Of the smaller laboratories, at Umtali 13,463 and at Gwelo 15,858 specimens were dealt with. These smaller laboratories are served by a trained laboratory technician whose work is supervised by the Director of the larger

laboratory. At the Government Analyst's laboratory 2,823 investigations were carried out, 745 of them in connexion with criminal matters.

From the foregoing account it will be seen that a hardworked Department is doing much good work with a depleted staff. *H. Harold Scott*

PANAMA CANAL. **Report of the Health Department of the Panama Canal for the Calendar Year 1944** [DOOLING, H. C., Chief Health Officer]. pp. vi+ 154, 2 graphs.

The Senior Medical Officers of the Panama Canal Health Department are military staff. Annual operating expenses exceed four million dollars, an expenditure covering the activities of the following five divisions :—

(*a*) Hospitals, dispensaries, etc.,
(*b*) Field sanitation,
(*c*) Control of Venereal Disease,
(*d*) District Nursing, Maternal and Child Welfare and School Health,
(*e*) Quarantine and Immigration.

The Health Service is provided primarily for the benefit of United States Government staff, military and civil, and for indigenous employees not all of whom reside in the Canal Zone. In the Annual Report the quantitative detail of all medical work in hospitals and laboratories is set out in tabular form ; figures for military personnel are not included. The total average number of employees in 1944 was 29,433 (13,811 in 1938) composed of 6,949 white and 22,484 coloured persons. The sick rate for the year was 1,364 per 1,000 employees ; the average number of sick persons per day was 22·34 per 1,000. Hospitalization rates were 423 white and 121 coloured per 1,000. The principal causes of admission to hospital (rate per 1,000) were as follows : Diseases of nasal fossae and adnexa (13), malaria (12) heart disease (9), bowel disease (8), pneumonias (8), gonococcal infection (7) and cellulitis (7). Among employees the death rates per 1,000 were, white 3·02, coloured 6·18 and total 5·43. For the general population the rates were 10·57 in Panama City (population 125,000) and 11·55 in Colon City (population 47,000). In these cities the principal causes of death with rates exceeding 1·0 per 1,000 were tuberculosis, pneumonia and organic disease of the heart ; in Panama City the tuberculosis death rate reached 2·21 per 1,000. The infant mortality rates were, Panama 69·6, Colon 83·92, and Canal Zone 31·19 ; birth rates were 34·03, 37·45 and 24·11 per 1,000 respectively. The Health Service maintain malaria control measures in the so-called " sanitated " areas of the Canal Zone so that this disease is no longer a major problem and the incidence rate has remained at about 12 per 1,000 for twenty years, with the exception of 1942.

As indicated by the length of the relevant section of this annual report, venereal disease control receives great attention through the clinics provided.

A high rate of respiratory infections in the general population is accepted as " usual " and the Health Officer for Colon comments :—

" The general health conditions remained good during the year, except the usual high rate of respiratory infections, particularly tuberculosis and pneumonia, which are no doubt due to the low standard of socio-economic conditions, the worst of which is the over-crowding in stable-like insanitary dwellings, where the average worker with a family of 5-plus occupies one small room and uses the sanitary units in common with hundreds of other occupants."

The Report contains a large number of detailed statistical tables.

R. Ford Tredre

DENOIX, P., with the collaboration of L. MAUJOL & M. MOINE. Une prospection médicale de deux mois en Haute-Volta (Octobre-Novembre 1948). [**A Medical Survey of Two Months' Duration in Haute-Volta (French West Africa).**] *Bull. Inst. Nat. Hyg.* Paris. 1949, Apr.–June, v. 4, No. 2, 264–90, 1 map & 5 graphs.

The most interesting feature of this survey is the use made of the records kept in 6 Roman Catholic Missions since the year 1901. The missionaries have kept registers of the names of persons baptized, and the dates, as well as the dates of birth in the case of baptized infants ; similarly, they have preserved records of marriages and deaths. These records are accurate, and through them a very exact estimate of death rates at various ages can be worked out within the limits of the rather small numbers recorded before about 1920. In one respect, of course, these communities do not represent the general African population, namely because the persons concerned were subject to the influence of the missions, which would extend to care for their physical well-being in addition to their religious instruction.

The infant mortality rates for all these missions together are calculated on the following figures, quoted so that the size of the community can be estimated :—

	Age 0–1				
	1901–10	1911–20	1921–30	1931–40	1941–45
Born	113	366	1,122	3,598	2,108
Died	43	108	213	807	320
Per 1,000	380	295	189	225	146

The rates for female infants were higher than the rates for male infants in the first two decades, but later they were about equal.

It seems evident that the infant mortality rates, though still very high, have been greatly reduced, probably because of mission education and care. If this is so the high rates of the first two decades may be an indication of the rates still experienced in the Africans outside mission influence. The authors found that the infant death rate was highest in March to May, the dry season, when there is much wind and dust, and great difference between day and night temperatures. A second rise was observed later in the year, during the rains. No clear idea of the common causes of death could be gathered from the records.

The death rates for other ages are given in detail.

The remainder of the paper is concerned with the prevalence of certain conditions :—tumours, goitre, keloid, glossitis (related to nutritional status) and onchocerciasis. The last was found in 20 per cent. of young men examined for military service. Three forms are distinguished : the usual nodular form ; a type with general thickening of the skin, often resembling *peau d'orange*, in the lower abdominal and inguinal regions, together with enlarged glands which often contain the microfilariae ; and a form with this thickened skin but without enlarged glands. In the last form microfilariae are not found, but the authors have little doubt that it is a manifestation of onchocerciasis. *Charles Wilcocks*

BOOK REVIEWS

Malaria and Mosquito Control. 63 pp., 10 figs. 1949. Nairobi: Highway Press. London: Longmans, Green & Co. Ltd., 6 & 7, Clifford Street, W. 1. [1*s*. 6*d*.]

"Malaria" writes the anonymous author of this little book, in his preface, 'is steadily becoming a disease of increasing importance to the African". This is an unusual remark, in view of the fact that in these hyperendemic areas malaria must have long been an important contributory cause of the high rate of infant mortality, and in the "seasonal" areas is always a serious cause of ill-health, and in view of the fact that treatment sufficiently effective to prevent death is now much more readily available to Africans, especially in rural areas, than it was 50 years ago. Yet there is a sense in which the disease is becoming more important, in that the means of preventing it are now more effective and more easily available than ever before, though the knowledge of those means is not so widespread as it should be. Moreover, malaria is spreading in some parts of Africa. The limiting factor in anti-malaria work may be rather the lack of trained staff, of all grades, than the lack of equipment and funds, and it is to provide a basis for the training of Africans that the book has been written.

There are 16 short chapters and 2 appendices, and the subjects dealt with include descriptions of malaria and the parasites; mosquitoes, their habits, stages and breeding places; principles of malaria control; protection against bites; methods of killing adults and larvae; naturalistic control and drainage; surveys; *Anopheles* control; *Aëdes* control; endemic and epidemic malaria. The appendices deal with map-making and the vocabulary of malariology.

The essentials of a booklet of this kind are that the statements made in it are correct so far as they go, that the language is simple without being childish, and that the intellectual level is suited to the readers for whom it is intended. In this booklet the statements are accurate, and it is obviously the work of an expert thoroughly versed in all aspects of the subject. The language is obviously calculated to be clear to the African reader and the idiom is adapted to this purpose, but as one reads on, one becomes less conscious of this tendency. The intellectual level is difficult to assess, and it would be unsuitable for a person to comment who is not engaged in the actual teaching of Africans of the appropriate standard of education. But the reviewer approves of the statement (p. 11) that "There is still much that we do not know, or only partly know, about anopheline habits . . . ." It is refreshing to see that the dogmatism which too often has characterized medical writing for Africans has been avoided. In this book there is considerable appeal to reasoning powers, and there is much explanation; but it is inherent in the subject that there is also much statement of fact, and the students who use the book are obviously expected to learn a lot of facts by the hard process of memorization. But they will be interested in what they read.

One point is perhaps open to criticism. On page 40 the author refers to the fact that anopheline mosquitoes breed in clean water, and suggests methods by which small pools, furrows or streams may be made "too dirty for *Anopheles*". These methods include putting vegetable matter, and even animal manure, into the water. The reviewer wonders if it is good in principle to advocate deliberate pollution of any water, in view of the usual public health teachings.

This is a trifling criticism of an admirable handbook, which can most emphatically be recommended. A complete version in the Swahili language is also published.

Charles Wilcocks

HOLMES, Francis O. **The Filterable Viruses.** Suppl. No. 2, Bergey's Manual of Determinative Bacteriology, Edition VI, 1948, with revised and enlarged Index. pp. 1127–1286+xxiii. 1948. London: Baillière, Tindall & Cox, 7 & 8 Henrietta Street, W.C.2. [20s.] (Review appears also in *Bulletin of Hygiene*.]

The section of Bergey's *Manual of Determinative Bacteriology*, 6th Edition, 1948 [see this *Bulletin*, 1949, v. 46, 188] which deals with the filterable viruses, has been published separately, though the pagination (1127–1286) remains as in the original *Manual*. An index has been incorporated which relates only to this section, and which refers not only to the viruses themselves (by their new and their old names), but also to the insect and other hosts, and to the diseases, concerned.

As was stated in the review of the complete *Manual*, the viruses have now been endowed with names in a scheme modelled on that long adopted in zoology and botany, and have been assigned to an Order (Virales) with 3 Sub-orders, 13 Families, 32 Genera and 248 species. It is impossible to foretell whether these divisions will be generally accepted, or will be adequate, and the question of nomenclature of bacteria and viruses is now being considered by various organizations; but it seems likely that the names proposed in this book will find their way into the literature, and for this reason it may be useful to quote some of them. The *Tropical Diseases Bulletin* has not at present adopted these names.

The viruses which concern readers of this *Bulletin* are those of the first and third Sub-orders, infecting bacteria and animals respectively. In the first Sub-order are the bacteriophages, here known as species of the genus *Phagus*. There are 46 species.

The viruses of the third Sub-order, which affect animals, are placed in several families, which include :—

Family Borreliotaceae	
genus *Borreliota*	the pox viruses
Briareus	the varicella group
Scelus	the herpes group
Hostis	the foot-and-mouth-disease group
Molitor	the wart-disease group
Family Erronaceae	
genus *Erro*	the encephalitis group
Legio	the poliomyelitis group
Formido	the rabies group
Family Charonaceae	
genus *Charon*	the yellow-fever group
Tarpeia	the influenza group
Tortor	the hog-cholera group
Family Rabulaceae	
genus *Rabula*	the mumps group

This section of the *Manual* contains much more than the names assigned to the various viruses, and the many "species" of the "genera" quoted. It includes descriptions of the diseases, the hosts and many [but not all] of the known insect vectors, and lists of the important papers on the various subjects. Even if the proposed names do not find general acceptance the section will serve as a valuable book of reference. *Charles Wilcocks*

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